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**WORK PLAN  
FOR THE  
REMEDIAL INVESTIGATION/FEASIBILITY STUDY  
OVERSIGHT  
AT THE  
WEST LAKE LANDFILL SUPERFUND SITE  
BRIDGETON, MISSOURI**

**VOLUME I**

**EPA Contract No. 68-W9-0032  
Work Assignment No. 23-7P14**

**May 27, 1993**

**SVERDRUP CORPORATION  
ST. LOUIS, MISSOURI**



40045710  
SUPERFUND RECORDS



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## 1.0 INTRODUCTION

This work plan presents and summarizes the procedures to provide oversight services to Region VII of the U.S. Environmental Protection Agency (EPA) for the Remedial Investigation/Feasibility Study (RI/FS) to be conducted at the West Lake Landfill located in Bridgeton, Missouri. This work is to be accomplished under the ARCS Program, as stipulated in the Statement of Work (SOW) for Work Assignment No. 23-7P14 under EPA Contract No. 68-W9-0032 with Sverdrup Corporation. This work assignment was officially received by Sverdrup on April 9, 1993. A scoping/introduction meeting was held via teleconference on April 16, 1993 to initiate planning activities of this work assignment.

The objective of this work assignment is to provide EPA with the personnel and technical expertise needed to assist with the oversight of the RI/FS activities being conducted by the Potentially Responsible Parties (PRPs) and their contractors. This assistance is to be provided through the following major activities:

- Field Oversight - Provide review and/or oversight of the PRPs remedial investigation. At the request of EPA, obtain split samples and have them analyzed independently to provide a quality control check of the PRPs sampling/analysis program.
- Review of Documents - Review, evaluate, and provide comments on technical documents submitted to EPA by the PRPs. At this time, the technical review and comment is limited to those documents identified by EPA in the SOW.
- Technical Assistance - Provide technical assistance to EPA, on an as-needed basis. This assistance may include participation in negotiations, project status meetings, technical briefings, and conference calls.
- Management Activities - Provide documentation and control requirements necessary for the efficient management of a work assignment under the ARCS Program. This includes Monthly Reports, invoicing and budget requirements, and final closeout of the work assignment.

The goal of this work assignment is to help EPA ascertain that the PRPs investigation is conducted in accordance with prepared plans. Comprehensive Environmental Response,



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Compensation, and Liability Act (CERCLA), and the RI/FS process.





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## **2.0 SITE BACKGROUND/HISTORY**

The West Lake Landfill is approximately 200 acres in size and is located at 13570 St. Charles Rock Road, Bridgeton, St. Louis County, Missouri. It is approximately four miles west of St. Louis' Lambert Field International Airport, near the intersection of Highways I-70 and I-270.

Limestone has been quarried at the site since 1939 and since 1962, portions of the quarried property have been used for the landfilling of municipal refuse, industrial solid and liquid wastes, and construction demolition debris. Quarrying and landfilling activities continue at the site.

In 1966, The Atomic Energy Commission (AEC) sold 8,700 tons of leached barium sulfate, along with other radioactive residues, to Continental Mining and Milling Company. These processing residues had previously been stored at the AEC's St. Louis Airport Storage Site. They had been generated as by-products of uranium processing which had been performed by the AEC's contractor.

Cotter Corporation purchased the residues from Continental Mining and in 1973, the radioactive leached barium sulfate residues were mixed with approximately 39,000 tons of soil and the entire amount was disposed of in Radiological Areas 1 and 2 at the West Lake Landfill.

In 1978, an aerial survey (sponsored by the Nuclear Regulatory Commission, NRC) revealed two areas within the Landfill where gamma radiation levels indicated radioactive material had been deposited. In 1980-81, Radiation Management Corporation (RMC) of Chicago, Illinois, performed a detailed radiological survey of the Landfill under contract to the NRC. This survey indicated that the radioactive contaminants were located in two areas of the Landfill. Radiological Area 2, the northern area of contamination, is approximately 13 acres in size and radioactive debris forms a layer 2 to 15 feet thick. Radioactive debris is exposed on the surface of the Landfill and along the berm on the northwest face of the Landfill. Radiological Area 1, the southern area, is approximately 3 acres in size with most of the contaminated soil buried under approximately 3 feet of soil and fill.

Results of the survey indicate that the radioactivity emanates from uranium-238 (U-238) and uranium-235 (U-235) series with thorium-230 (Th-230) and radium-226 (Ra-226). The average Ra-226 concentration in the radioactive wastes is approximately 90 picocuries per gram (pCi/g); the average Th-230 concentration estimated to be approximately 9,000 Pci/g.



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The Oak Ridge Associated Universities (ORAU) contracted with the University of Missouri to conduct a study in which it was determined that erosion of the berm was occurring and that there were elevated concentrations of Ra-226 and Th-230 at the base of the berm and extending into the adjacent field. In 1985 and 1986 two rounds of samples were collected from 18 nearby monitoring wells which are screened at the shallow, intermediate, and deep intervals of the aquifer. The groundwater samples were analyzed for priority pollutants and gross alpha and beta radiation. Detectable compounds included: methylene chloride, bis-2-ethylhexyl phthalate, phenol, cyanide, sodium, iron, lead, arsenic, antimony, nickel, thallium, and zinc. Trace amounts of several pesticides were also detected, including: lindane, chlordane, dieldrin, endrin, 4,4'DDD, 4,4'DDE, 4,4'DDT, and hexachlorobenzene. Gross alpha readings measured ranged from 2 to 270 Pci/l and gross beta readings ranged from 11 to 171 pCi/l.

In May 1986, 32 wells at the site were sampled and analyzed for gross alpha, gross beta, and radium by ORAU. Gross alpha, Ra-226, and Ra-228 were found to be below the permissible maximum contaminant levels for community water systems set forth in 40 C.F.R. Part 141. Concentration levels found were: gross alpha, 0.9-8.4 pCi/l; gross beta, 1.9-22 pCi/l; Ra-226, 0.2-0.7 pCi/l; Ra-228, 0.2-5.8 pCi/l; U-total, 1.6-25 pCi/l; Th-228, 0.2-1.7 pCi/l; Th-230, 0.1-12 pCi/l; and Th-232, 0.2-4.0 pCi/l.

Some site contaminants are known human carcinogens, including: uranium, thorium, radium, protactinium, and actinium. Methylene chloride and lead are probable human carcinogens, and phenol is considered a suspected carcinogen and mutagen. The pesticides detected at the site are chlorinated and considered probable carcinogens, and some are reproductive toxins. In addition, some contaminants are considered to be hazardous substances as defined in CERCLA, Section 101(14), 42 U.S.C. [ ] 9601(14), including: U-238, U-235, Th-230, Ra-226, the pesticides, methylene chloride, phenol, and lead.



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### **3.0 PROJECT APPROACH**

The activities of the work assignment are delineated into fourteen individual tasks, all of which involve oversight of work in progress, review of completed work, general assistance to EPA by participating in conference calls, site visits, coordination meetings, and technical review meetings.

Work on each of the stipulated tasks will be completed as follows:

- Upon initiation of the work assignment, the Project Manager will begin to develop the Project Team. Resumes of key individuals will be assembled for EPA to review.
- Upon receipt of a work assignment task, the Project Manager will assess the technical requirements and assign work to the appropriate team member(s) as required.
- The Project Manager will discuss the overall task approach with the EPA-Remedial Project Manager (RPM).
- The Project Manager will resolve any differences concerning the initially assumed and apparent budget and schedule.
- Work will then be initiated.
- All review comments, meeting notes, and records of discussions will be compiled and organized within a report.
- The draft report will be subjected to a quality assurance/quality control (QA/QC) review, finalized, and sent to EPA for review and comment.
- The draft report will be modified to incorporate the review comments and issued to the EPA as a final report.

#### **3.1 Task 1 - Work Plan Preparation**

This report represents the RI/FS Oversight Work Plan. Incorporated into this task is the initial site visit and scoping meeting, the planning effort to provide labor and cost estimates, and the initiation of the involvement of team members Los Alamos Technical Associates, Inc. (LATA) and Life Systems, Inc. (LSI).

#### **3.2 Task 2 - Project Monitoring and Control**

Overall control of project progress, schedule, and budget is included under Task 2.



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Reports will be provided on a monthly basis regarding the technical and financial status of the work assignment. Senior managerial oversight of the project will be provided by the Project Manager to ensure that the objectives established in the work assignment are being achieved. Monthly reports will include task specific tracking which will denote the number of hours expended per specific task during the reporting period.

### **3.3 Task 3 - File Review for Site Familiarization**

Upon acceptance of the Work Plan, a file review will be performed in order to become familiar with the background information available on the site conditions. Discussions may take place between Sverdrup, LATA, and EPA's negotiation support contractor (with approval by the RPM) to aid in familiarization of the site.

### **3.4 Task 4 - Site File Summary Report**

Upon completion of Task 3, a summary report will be provided to the EPA RPM on the reports of past investigations and site information that was made available for review. The goal of this report is to identify gaps in past investigations regarding areas not previously addressed and will also provide information regarding contaminants of concern and extent of contamination at the site.

### **3.5 Task 5 - Attend Meetings and Conference Calls**

At the request of the EPA RPM, Sverdrup and team members LATA and LSI will participate in technical meetings and conference calls regarding work to be performed at the site. Notes for such meetings and conference calls will be submitted to EPA in the form of a Telecon Memo that provides a summary of items discussed. Proceedings of the meetings, shall be submitted following the Telecon Memo, at the request of the RPM.

### **3.6 Task 6 - RI/FS Documents Review**

Activities under Task 6 include the review of technical submittals and technical portions of submittals related to the site RI/FS deliverables. Comments will be developed to inform EPA of the technical adequacy of the RI/FS documents for satisfying the requirements of the





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Baseline Risk Assessment, Feasibility Study, and Record of Decision. The RI/FS documents anticipated for review (and included in the SOW) include the following:

- Final Work Plan
- Draft and Final Sampling and Analysis Plan - It is assumed that the SAP will contain the Quality Assurance Project Plan and Standard Operating Procedures.
- Health and Safety Plan
- Draft and Final Interim Investigation Results
- Site Characterization Summary Report
- Draft and Final Remedial Investigation Report
- Refined Remedial Action Objectives
- Development and Screening of Remedial Alternatives
- Comparison of Remedial Alternatives
- Draft and Final Feasibility Study Report

Comments on the above documents will be made in compliance with CERCLA, the National Contingency Plan (NCP), and all applicable EPA guidance documents. The comments will be provided to EPA in a letter format according to an example provided by the RPM.

### **3.7 Task 7 - Field Oversight/Site Visits**

Field oversight will be conducted at the request of the RPM. It is anticipated that the field oversight will be performed on an as needed basis and a continual presence on the sight will not be required. Every effort will be made to provide oversight personnel on short notice, however, since personnel will not be assigned to this project on a full time basis, it is assumed in this work plan that at least two weeks notice will be given prior to each field oversight activity. All oversight activities will be performed using current or revised Sverdrup approved Health and Safety Program Plans.

The oversight personnel will monitor activities, document field procedures, evaluate health and safety practices, substantiate decontamination effectiveness, observe waste management practices, record activities by photographs, and evaluate conformance with EPA approved prepared plans and protocols. Documentation will be made of any deviation from protocol, reasons for



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deviation, and possible effects on the resulting data quality. The documentation will confirm that the activities conducted by the PRPs are performed in accordance with the Administrative Order on Consent, the NCP, and all applicable EPA guidance documents. Potential problems or significant occurrences identified during the oversight activity will also be recorded and reported.

Sverdrup will communicate with the EPA RPM on possible contingency plans should problems arise during the field investigation that may effect data quality. The oversight personnel will not have the authority to mandate changes and will only make recommendations and communicate with the EPA RPM. As directed by the RPM, the oversight observer will discuss the situation directly with the field personnel's immediate supervisor. Resolution of the problem may be attempted through the appropriate site personnel.

Documentation will be provided through the use of controlled field log books and generation of daily field reports. Log books will be bound, sequentially numbered notebooks and will be used to record all field activities. All photographs will be logged in the field log book with a brief description and will be date imprinted automatically at the time of exposure. Upon receipt of the photographs following development, the field inspector will number the photos and will prepare a photo log sheet with a brief description to be included with the photos in the project file.

Oversight activities may include the collection and analysis of split samples. Procedures for sample collection, analysis, and custody are broadly defined in the Generic Quality Assurance Project Plan (QAPP) which has been provided to Sverdrup by EPA. A site specific QAPP will be prepared and provided to EPA for approval. The site specific QAPP will contain a sampling schedule, sampling personnel, purpose of sampling, and any necessary pertinent information that is not included in the Generic QAPP. If requested by the RPM, an Analytical Services Request form will be completed.

At the conclusion of each visit, a field investigation report shall be prepared and submitted to the EPA RPM. This report will summarize oversight findings and recommendations, describe sampling activities and site conditions during the sampling event, discuss problems encountered (including their resolution) during field activities, present the results of any tests conducted during field operations, provide all visual soil classification data, and contain any other notes generated during field operations. At the direction of the RPM, addenda to the field investigation report may be produced in which sample analytical results are compared to those



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reported by the PRP.

### **3.8 Tasks 8 through 12 - Baseline Risk Assessment**

Tasks 8 through 12 refer to the development of the Baseline Risk Assessment (BRA) and the required interim deliverables. The EPA RPM has indicated that the Missouri Department of Health (MDOH) has been assigned these tasks and the Sverdrup team will not be responsible for the coordination of this effort.

### **3.9 Task 13 - Project Closeout**

Closeout activities will begin when directed by the RPM. Tasks to be conducted for closeout of this project include reproduction of files, organization of files and records, and the packing of files and materials for return to EPA Region VII. It is assumed that microfiche is not a requirement for the closeout of this project. Throughout the duration of the project, files will be properly maintained and reproduced as necessary to facilitate an efficient closeout of the project.

### **3.10 Task 14 - Review of Baseline Risk Assessment**

The majority of the review of the Baseline Risk Assessment/Human Health Evaluation for the West Lake Landfill will be performed by Life Systems, Inc. Under Task 8, a review of site data is to be accomplished by MDOH, resulting in a report of comments as to the adequacy and sufficiency of data for the BRA. Life Systems will review this report, as well as the other required interim deliverables to be developed by MDOH, including the selection of chemicals of potential concern and the site data evaluation procedures. An evaluation of the comparison of potential site contaminants with background levels will also be performed.

The exposure assessment will be reviewed. This will include a review of the characterization of physical settings, identification of exposed populations and potential exposure pathways, and the conceptual site model. The results of any groundwater or air modeling, if conducted, will be reviewed. A technical memorandum will be prepared and submitted to EPA documenting technical concerns.

The toxicity assessment will be reviewed. Critical toxicity values and adverse health effects for each chemical of potential concern will be reviewed and evaluated. The estimated dose



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equivalent (EDE) for potential radioactive exposure routes will be reviewed and evaluated against National Emission Standard for Radionuclide Emissions (NESHAPs) and other applicable guidance. A QC check of data retrievals will be conducted (a check of IRIS and current HEAST). A technical memorandum will be prepared and submitted to EPA documenting technical concerns.

Life Systems will perform QA/QC checks on all the basic risk calculation equations. It assumed that all data entry and exposure point calculations will be done correctly and that all calculations will be performed using a computerized spread sheet (*i.e.* no QA/QC required). Only the initial series of calculations will need to be verified by this strategy. The Draft BRA will be evaluated in order to determine if it is adequate to support risk management decisions. For example, the Draft BRA will be evaluated to consider if it will provide a defensible, legal basis for either clean-up or the no action alternative. A technical memorandum will be prepared and submitted to EPA documenting technical concerns. A review of the Final BRA will be performed to assess that appropriate changes and/or calculations were performed.





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#### 4.0 PERSONNEL

The principal management personnel assigned to this work assignment include Mr. Dave Bockelmann as the Sverdrup ARCS Program Manager, Ms. Robin Rodriguez as the Sverdrup Project Manager, and Mr. Robert Lowy as the LATA Site Manager. Other technical personnel scheduled to perform tasks under this work assignment include Dr. Wesley Bradford, Dr. Bernard Graham, and Dr. Robert Hull, all with LATA and Dr. Fanny K. Ennever of LSI. A list of these individuals are included below along with a description of their responsibilities on this project and their affiliations.

Dave Bockelmann Program Manager Sverdrup Corporation (314) 436-7600	Overall ARCS program responsibility.
Robin R. Rodriguez Project Manager Sverdrup Corporation (314) 436-7600	Responsible for coordination of the Project-Task activities
Robert M. Lowy LATA Task Manager Los Alamos Technical Assoc. (509) 783-4369	Site Manager and technical coordinator for site activities and document reviews.
Dr. Wesley Bradford Principal Engineer Los Alamos Technical Assoc. (505) 884-3800	Responsible for technical support on landfill closure design and groundwater monitoring design issues.



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Dr. Bernard Graham  
Principal Engineer  
Los Alamos Technical Assoc.  
(208) 529-5282

Responsible for technical support on  
health physics and radiological issues.

Dr. Robert Hull  
Principal Engineer  
Los Alamos Technical Assoc.  
(505) 884-3800

Responsible for technical support on  
site geochemical, radiological, and  
hydrogeological issues.

Dr. Fanny K. Ennever  
Toxicologist  
Life Systems, Inc.  
(919) 765-8422

Responsible for the technical review of the  
Baseline Risk Assessment.

Other personnel may be involved from Sverdrup, LATA, and LSI, however it cannot be anticipated during the initial project planning stages which individual will be scheduled to perform a designated task. Personnel will be chosen for specific tasks based upon their area of expertise, level of experience, and availability. The EPA RPM will be notified of the qualifications of personnel providing support for the various tasks required.



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## **5.0 HEALTH AND SAFETY**

The work assignment tasks will require that Sverdrup Team personnel visit and work in controlled-access areas at the West Lake Landfill site. It is anticipated that 1) all work during the field investigation will be conducted by the PRPs contractor and 2) Sverdrup Team members will visit the site only when such contractors are present. Sverdrup plans to coordinate activities with these contractors and use their monitoring and decontamination facilities so that separate facilities for Sverdrup Team personnel will not be required. Protective clothing and respiratory protection equipment will be supplied by the Sverdrup Team for its personnel.

The RI/FS Health and Safety Plan (HSP) developed by the PRPs contractor is one deliverable to be reviewed by Sverdrup (under Task 6). In order to avoid the reduce duplication of effort, Sverdrup will provide comments on this HSP which would result in a HSP that the Sverdrup oversight Team will accept and follow in lieu of writing a separate document. However, Sverdrup's Health and Safety Officer will determine issues regarding any exceptions, and if necessary, an addendum will be prepared covering the item(s) of concern.

Prior to initiating site activities, Sverdrup Team personnel will be briefed about site control measures of the specific HSP with emphasis on contractors protection requirements, decontamination procedures, monitoring practices, site characteristics, emergency system, contingency plans, and identify those individuals responsible for Health and Safety.



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## **6.0 QUALITY ASSURANCE**

All project personnel assigned to this work assignment will be responsible for compliance with the requirements of Sverdrup's QAPP (Attachment D of Sverdrup's ARCS Management Plan). All documents and deliverables produced under this work assignment will be checked and reviewed using standard QC procedures as outlined in the QAPP.

It is anticipated that the only new data generated will be limited to the collection and analysis of split samples during a PRP sampling activity. As described under Task 7, the site specific QAPP will be followed by all Sverdrup Team members involved in this activity.





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## **7.0 SCHEDULE**

Sverdrup received this work assignment on April 9, 1993 and this Work Plan will be submitted to EPA on May 10, 1993. The anticipated duration of this work assignment is until October of 1994. A detailed schedule of tasks and submission dates of deliverables cannot be provided at this time due to lacking information of the overall RI/FS activities schedule from the PRPs contractor. Instead, Sverdrup deliverables will be provided to EPA in the turn-around-time requested by the RPM. The following are turn-around-time goals of the submission of Sverdrup deliverables (or as approved by the RPM):

- Task 1: Work Plan - Thirty (30) days after issuance of the work assignment.
- Task 3: Start of the File Review - Upon approval of the Work Plan
- Task 4: Site File Summary Report - Fifteen (15) days upon the approval of the Work Plan.
- Task 5: Meeting and Conference Call Notes - Three (3) days from conclusion of the meeting.
- Task 6: Document Review and Comments - Fifteen (15) days from receipt of the submittal.
- Task 7: Field Activity Report - Two (2) weeks after completion of the oversight work.
- Task 7: Analytical Services Request and Addendums to the Generic QAPP - Seven (7) days from request of the RPM.
- Task 14: BRA Review - Thirty (30) days from receipt of the BRA.



## **APPENDIX I**

### **STATEMENT OF WORK**



**REMEDIAL INVESTIGATION/FEASIBILITY STUDY  
STATEMENT OF WORK  
WEST LAKE LANDFILL**

**I. PURPOSE**

This Statement of Work (SOW) outlines several tasks to be completed for the oversight of the Remedial Investigation/Feasibility Study (RI/FS) at the West Lake Landfill (WLL) site which is located in Bridgeton, Missouri (CERCLIS NO. MOD079900932). The contractor is requested to provide oversight and prepare a Baseline Risk Assessment (BRA) as described in this SOW.

The focus of this SOW is Operable Unit 1 (OU 1) which is described as Radiological Areas 1 and 2 at the site. The Administrative Order on Consent (AOC) and the Statement of Work (SOW) for the performance of the RI/FS by the PRPs is provided in Attachment 1.

**II. BACKGROUND**

a. The Landfill is comprised of approximately 200 acres located at 13570 St. Charles Rock Road, Bridgeton, St. Louis County, Missouri, and is approximately 4 miles west of St. Louis' Lambert Field International Airport, near the intersection of Highways I-70 and I-270. Limestone was quarried at the Landfill from 1939 to the present. Since 1962 portions of the quarried property have been used for landfilling municipal refuse, industrial solid and liquid wastes, and construction demolition debris.

b. In 1966, the Atomic Energy Commission ("AEC") sold 8,700 tons of leached barium sulfate, together with other radioactive residues, to Continental Mining and Milling Company ("Continental Mining"). The radioactive residues were generated as by-products of uranium processing performed by the AEC's contractor. These processing residues were stored at the AEC's St. Louis Airport Storage Site ("SLAPSS").

c. Continental Mining removed the radioactive residues to its facility at 9200 Latty Avenue in Hazelwood, Missouri. Eventually, Cotter purchased the radioactive residues and shipped all but the 8,700 tons of leached barium sulfate to its processing facility in Colorado.



d. In 1973 approximately 8,700 tons of radioactively contaminated leached barium sulfate residues were mixed with approximately 39,000 tons of soil, and the entire amount was disposed of in Radiological Areas 1 and 2, which are described in Paragraph 12, at the Landfill. This material resulted from decontamination efforts undertaken by Cotter at 9200 Latty Avenue, St. Louis, Missouri, where the residues had been stored.

e. In 1978, an aerial survey sponsored by the Nuclear Regulatory Commission ("NRC") revealed two areas within the Landfill where gamma radiation levels indicated radioactive material had been deposited. In 1980-81, Radiation Management Corporation ("RMC") of Chicago, Illinois, performed a detailed radiological survey of the Landfill under contract to the NRC. This survey was performed to determine the extent of radiological contamination. This survey indicated that the radioactive contaminants were located in two areas of the Landfill. The northern area of radioactive contamination ("Radiological Area 2") is comprised of approximately 13 acres. The radioactive debris in this area forms a layer 2 to 15 feet thick, with radioactive debris exposed on the surface of the Landfill and along the berm on the northwest face of the Landfill. The southern area of radioactive contamination ("Radiological Area 1") is comprised of approximately 3 acres with most of the contaminated soil buried under approximately 3 feet of soil and fill.

The RMC survey indicated that the radioactivity emanates from uranium-238 ("U-238") and uranium-235 ("U-235") series with thorium-230 ("Th-230") and radium-226 ("Ra-226"). The survey data indicate that the average Ra-226 concentration in the radioactive wastes is approximately 90 picocuries per gram ("pCi/g"), with the average Th-230 concentration estimated to be approximately 9,000 pCi/g. Since Ra-226 has been depleted with respect to its parent Th-230, Ra-226 activity will increase in time (for example, over the next 200 years, Ra-226 activity will increase ninefold over the present level).

f. In addition to RMC's radiological survey, the NRC through Oak Ridge Associated Universities ("ORAU") contracted with the University of Missouri-Columbia Department of Civil Engineering to describe the environmental characteristics of the Site, conduct an engineering evaluation, and propose possible remedial actions for dealing with the radioactive materials at the Site. In March of 1984 a radiological survey along a section of a berm bounding the Landfill was performed by ORAU.

g. Measurements of direct radiation levels and radionuclide concentrations in soil and the physical condition of the berm area indicated that erosion was occurring and that there were elevated concentrations of Ra-226 and Th-230 at the base of the berm and extending into the adjacent field. A sample from the mound of soil at the base of the berm contained 185 pCi/g of Ra-226 and 6,270





pCi/g of Th-230. Samples collected in the adjacent field contained 4.29-4.47 pCi/g of Ra-226 and 132-178 pCi/g of Th-230. In May 1986, ORAU sampled water wells on and close to the Landfill to determine if radioactive contamination had migrated into the groundwater. The sampling consisted of 18 monitoring wells which are located in various locations around the Landfill and are screened in the shallow, intermediate, and deep parts of the aquifer. Two sampling rounds were evaluated. Round 1 occurred from December 11-15, 1985 and Round 2 from May 19-21, 1986. All samples were analyzed for priority pollutants listed under 40 C.F.R. Part 122, Appendix D. This list includes volatile organics, acid and base/neutral extractables, pesticides, polychlorinated biphenyls ("PCBs"), total phenols, total cyanide, and metals. Four wells sampled during Round 1 were also analyzed for gross alpha and beta radiation.

h. Chemical results indicated that samples from certain wells contained detectable levels of several constituents. Chemicals found during Round 1 included methylene chloride (2-83 micrograms per liter ("ug/l"), bis-2-ethyhexyl phthalate (4-477 ug/l), phenol (7-19 ug/l), total cyanide (1-6 ug/l), sodium (5-175 milligrams per liter), iron (20-14,380 ug/l), lead (13 ug/l), and zinc (2-1,240 ug/l). Trace amounts of several pesticides also were detected such as lindane, chlordane, dieldrin, endrin, 4,4'DDD, 4,4' DDE, 4,4' DDT, and hexachlorobenzene. The four wells sampled for gross alpha and beta radiation during Round 1 contained values for gross alpha ranging from 2-270 picocuries per liter ("pCi/l") and values for gross beta ranging from 11-171 pCi/l. Round 2 chemical results indicated the presence of methylene chloride (6-10 ug/l), bis-2-ethyhexyl phthalate (10 ug/l), total cyanide (7 ug/l), zinc (2-2,000 ug/l), and arsenic (4-9 ug/l). Compounds such as antimony, nickel, and thallium also were found.

i. In May 1986, 32 wells at the Site were sampled and analyzed for gross alpha and beta by ORAU. Isotopic analyses were performed on many of the samples to determine radium levels. The radionuclide concentrations were found to be gross alpha (0.9-8.4 pCi/l), gross beta (1.9-22 pCi/l), Ra-226 (0.2-0.7 pCi/l), Ra-228 (0.2-5.8 pCi/l), U-total (1.6-25 pCi/l), Th-228 (0.2-1.7 pCi/l), Th-230 (0.1-12 pCi/l), and Th-232 (0.2-4.0 pCi/l). The concentrations for gross alpha, Ra-226, and Ra-228 are below the permissible maximum contaminant levels for community water systems set forth in 40 C.F.R. § 141.

j. Direct contact with, and air transport of, radiological contamination would primarily affect persons working in and around the Site. Surface water runoff from the Landfill primarily flows to a drainage ditch along the north side of the Landfill and the south side of St. Charles Rock Road. This ditch may occasionally be recharged by groundwater. This surface water either recharges the groundwater or discharges through a drainage ditch to the



Missouri River. A pond along this ditch is located on the north side of the Landfill and is known to contain fish. Surface water runoff to the south and southwest flows across relatively flat agricultural fields. This runoff joins the small intermittent ditches which traverse the area. Groundwater contamination could affect persons using groundwater downgradient of the Landfill before it discharges to the Missouri River.

k. In a report entitled "Hydrogeological Investigation, West Lake Landfill, Primary Phase Report" prepared by Burns & McDonnell in October 1986, it was stated that the predominant groundwater flow direction in the alluvial aquifer in the vicinity of the Site is northwestward toward the Missouri River. The water table generally slopes toward the Missouri River, although changes in gradient direction apparently occur at some times during the year in response to changes in the stage of the Missouri River. The alluvial aquifer consists of a continuous sequence of sand deposits with some gravel zones. The alluvium at shallow depths is primarily fine to medium sand, with only traces of gravel. The alluvium in the deeper part of the aquifer is coarser grained, consisting primarily of coarse sand and gravel.

l. Uranium, thorium, radium, protactinium, and actinium are all known human carcinogens. Methylene chloride and lead are both probable human carcinogens. Phenol is a suspected carcinogen and mutagen.

m. The following pesticides were detected in analyses of groundwater samples taken at the Site: gamma BH (Lindane), chlordane, dieldrin, endrin, 4,4' DDD, 4,4' DDE, 4,4' DDT, and hexachlorobenzene. These highly-chlorinated pesticides are probable carcinogens. They are toxic to humans via ingestion and dermal contact. Some are reproductive toxins.

n. U-238, U-235, Th-230, and Ra-226, the pesticides identified in Paragraph 21, above, methylene chloride, phenol, and lead are hazardous substances as defined in CERCLA Section 101(14), 42 U.S.C. § 9601(14).

o. Pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, EPA placed the Site on the National Priorities List, set forth at 40 C.F.R. Part 300, Appendix B, by publication in the Federal Register on August 30, 1990, 55 Fed. Reg. 35502.

p. Cotter Corporation (N.S.L.) is a corporation organized and existing pursuant to the laws of the State of New Mexico.

q. Laidlaw Waste Systems (Bridgeton), Inc. is a corporation organized and existing pursuant to the laws of the State of Missouri.



r. Rock Road Industries, Inc. is a corporation organized and existing pursuant to the laws of the State of Missouri.

s. The United States Department of Energy is a department of the United States Government and is a successor to the Atomic Energy Commission.

t. Cotter, by contract, agreement, or otherwise arranged for the disposal, or arranged with a transporter for transport for disposal, hazardous substances owned or possessed by it at the Site.

u. At the time of disposal of hazardous substances at the Site, West Lake Landfill, Inc. (now known as Laidlaw Waste Systems (Bridgeton), Inc., and referred to herein as Laidlaw) was an owner or operator of the Site.

v. DOE, by contract, agreement, or otherwise arranged for the disposal, or arranged with a transporter for transport for disposal, hazardous substances owned or possessed by it at the Site.

w. Rock Road is a current owner of the Site.

### III. DESCRIPTION OF WORK

These activities will include but is not limited to the following tasks:

#### a. TASK 1. Work Plan Development

The work plan shall be developed to include and follow only the tasks and requirements listed below. A section with personnel qualifications shall be added to assure that only qualified personnel are used on this project. Base fee and anticipated award fee shall be budgeted in the work plan. All assumptions within the budget estimate should be clearly defined in the work plan. A scoping meeting shall be held via teleconference within 3 days after issuance of work assignment and prior to work plan development. A work plan shall be submitted 30 days after issuance of work assignment.

#### b. TASK 2. Project Monitoring and Control

The contractor shall provide oversight and control of project progress, schedule and budget. Such efforts shall include monthly status reports, on the technical and financial status of the work assignment and to provide senior managerial oversight of the project to ensure the objectives established herein are being achieved.



Task specific tracking is required for this work assignment. Monthly progress reports shall include the number of hours expended per specific task (e.g., number of hours for a specific document review, number of hours to prepare specific trip reports, number of hours for specific field oversight events etc.,) for that reporting period along with the percent completion for that task.

c. TASK 3. File Review for Site Familiarization

The contractor shall review the Site file including all available background information (such as well log information, site regional geological information developed by government or private sources) in order to become technically familiar with the Site. The contractor shall discuss current site evaluations with EPA negotiation support contractor with the approval of the RPM to aide in familiarization of the Site. The contractor shall review former comments and trip reports completed during negotiations. The file review shall begin upon approval of work plan.

d. TASK 4. SITE FILE SUMMARY REPORT

The contractor shall provide a summary report to the RPM on past investigations and available site information. The report should identify areas not addressed in past investigations and provide information regarding site contaminants of concern. The purpose of the summary report is to provide the deliverable for Task 3 to document the file review and contractors technical analyses. The summary report shall be submitted 15 days upon the approval of the work plan.

e. TASK 5. ATTEND MEETINGS AND CONFERENCE CALLS

At the request of the RPM the contractor may be required to participate in technical meetings (i.e., scoping meetings, technical discussions with the PRPs etc.) and conference calls regarding work to be performed at the site. Notes for all meetings and conference calls shall be submitted within 3 days from the conclusion of the meeting to the RPM. The notes shall include a summary of items discussed and proceedings of the meetings shall be completed and submitted within two weeks, unless otherwise approved by the RPM.

f. TASK 6. DOCUMENT REVIEW

Review technical submittals and technical portions of submittals related to the site providing comments on their adequacy. The submittals will include the deliverable list provided in Attachment 2 and additional reports, records, and documentation submitted by the PRPs to the EPA for review.





Comment and approval will be reviewed for compliance with CERCLA, the National Contingency Plan (NCP), and all applicable EPA guidance documents. Reviews shall be completed within 15 calendar days after receipt with the submittal of a comment letter unless otherwise approved by the RPM. The comments should be submitted to EPA in letter report format. The RPM will provide a comment letter report format to the contractor in which should be used unless otherwise approved by the RPM. Contractor shall submit all comments in Wordperfect 5.1 format, 1 hardcopy along with diskette copy, and the format print should be Courier 10 cpi unless otherwise approved by the RPM.

Note: For cost estimating purposes, the document list in Attachment 2 will be only documents considered for review under this task. Exclude from review and cost estimating purposes the Treatability Study submittals which are identified in Attachment 2 with an as needed statement.

**g. TASK 7. FIELD OVERSIGHT/SITE VISITS**

Field oversight of PRP field work shall be performed at the request of the RPM. Collection of split samples may be required and the procedures are defined in the Generic Quality Assurance Project Plan (QAPP) provided by EPA (Attachment 3). field oversight shall consist of the following:

i. Site visit should be planned to become familiar with the site once the file review (Task #3) has been completed. A trip report shall be submitted within 2 weeks of all site visits to the RPM.

ii. Documentation of all field activities which should include taking photographs and/or recording events by camcorder;

iii. A field log containing all personnel onsite and a brief summary of activities shall be kept.

iv. The contractor's oversight of RI/FS field activities shall include the maintenance of records and documentation to provide evidence that the activities conducted by the PRPs are performed in accordance with the EPA approved RI/FS Work Plan and QAPP, the Administrative Order on Consent (AOC), the National Contingency Plan (NCP) and all applicable EPA guidance documents. This documentation shall be included in the trip report discussed below. A trip report shall be submitted to the RPM within 2 weeks of completion of oversight work unless otherwise approved by the RPM. The field investigation report shall summarize the sample types and their location, Site conditions during the sampling event, problems encountered (including their resolution) during field activities, the results of any



tests conducted during field operations, all visual soil classification data, and any other notes generated during field operations.

v. Sampling may be required at the request of the RPM. Personnel performing the field oversight or sampling activities must have at least two years of practical field experience in the technology/activity being overseen. The site specific sampling requested by the RPM to be performed must be addressed in an addendum to the attached QAPP. Addendums to this plan will be required if the contractor will be collecting samples. The QAPP addendums shall contain the sampling dates, sampling personnel, purpose of sampling and any necessary pertinent information that is not included in the QAPP. A sample Addendum format is attached to the Generic QAPP. Included with the Addendum shall be the Analytical Services Request (ASR) form only if completion is requested by the RPM. Addendums shall be completed within seven (7) days of request unless otherwise approved by RPM. Once the Site Description and Site History section of the Addendum is developed, those sections shall be reused for subsequent Addendums (this shall apply to all sections that may be reused) to avoid duplication of effort and for consistency. Note that the Addendums are on the order of 3-10 pages in length.

Note: This work assignment allows for 5 site visits. One trip at a 1 day duration and 4 at 3 days duration for cost estimating purposes.

**h. TASK 8. REVIEW OF SITE DATA FOR BRA**

i. The contractor will provide a qualitative review and discussion of the sampling data including but not limited to adequacy of data for BRA, accuracy of data and results, deficiencies in data and sampling, and sufficiency of data to complete the BRA. The site data review will be in conjunction with the Site Characterization Report deliverable review. The review comments for the report is due within 21 days of receipt of PRP deliverable.

ii. Chemicals of Concern: Using RAGS guidance, the contractor will develop the chemicals of concern (COC), by media, for the Site and provide the methods and rationale for developing the list.

NOTE: The data review should be coordinated with the Site Characterization and RI review which would eliminate duplication of effort. The majority of LOE should be considered during the document review (Task 6).



i. TASK 9. EXPOSURE ASSESSMENT

The contractor will develop the following which are part of the baseline risk assessment at the request of the RPM:

i. A conceptual site model which includes both current and potential future use. The conceptual site model should be presented in the form of an iterative flow chart which depicts specific site characteristics to include: (1) contaminant sources; (2) release mechanisms; (3) transport routes; (4) exposure routes; and (5) receptors. The model should clearly provide for conceptual understanding of pathway interrelations and should include aspects pertaining to both human health and ecological risk at the site. It should be presented in schematic format. The conceptual site model will serve as the iterative foundation for the development of the final baseline risk assessment. The model shall be submitted 35 days prior to the draft BRA.

ii. Exposure scenarios for both current and potential future site use. Scenario development should include a description of receptors and pathways of exposure for both human and ecological components of the baseline risk assessment. This section should also include a table detailing all exposure algorithms and specific parameters to be used in the risk assessment report. Parameters employed should be consistent with those found in the Exposure Factors Handbook (EPA/600/8-89/043) or the OSWER Directive 9285.6-03 Standard Default Exposure Factors and should be clearly justified. Exposure parameters which deviate from those provided in the above documents, should be completely referenced with accompanying explanations for the deviation. A final list of the exposure parameters (average and RME) to be used in the risk assessment must be submitted to the RPM for review prior to calculation of the risk estimates. The information herein Task 10 part ii shall be submitted 15 days after receipt of the PRPs Site Characterization Report.

iii. Proposals and recommendations for Fate and Transport analysis and/or modeling. This task is primarily directed toward the transport of chemical contaminants from surface and subsurface soils into groundwater. This data will be used in developing remediation goals for soil that are protective for the groundwater exposure pathway.



j. TASK 10. TOXICITY ASSESSMENT

i. Included in the toxicity assessment for each chemical of concern should be a short description of the critical study(ies) used to derive the numerical estimate of toxicity presented on IRIS or HEAST. The description should include: (1) species employed; (2) toxicity endpoint or target organ (both human health and ecological receptors); (3) duration of the study; and (4) overall weight of evidence or uncertainty factors applied and rationale. A summary table of contaminants, reference values, (RfD and cancer potency values, other relevant toxicity end points) and citations. Include data on absorption values. The table should be provided 10 days after receipt of the PRPs Site Characterization Report

ii. The toxicity assessment must include sound rationale for the additivity of any hazard quotients in the development of the hazard index.

iii. Route to route extrapolations must be presented 10 days after receipt of the PRPs Site Characterization Report to the RPM for review prior to inclusion in the baseline risk assessment.

k. TASK 11. RISK CHARACTERIZATION

i. Contractor shall characterize non-carcinogenic hazard quotients and life time excess carcinogenic risks for each pathway and exposed population from individual chemicals and risks from multiple chemicals. Combinations of risk across exposure pathways for individual and combinations of chemicals shall also be calculated.

Total risks should be calculated as appropriate.

ii. Contractor shall prepare summary tables of risk calculations. Summary tables and figures should comply with the format presented in RAGS (Part A), Chapter 8.

A qualitative discussion of environmental risks is to be included in the report.

If a quantitative uncertainty analysis is being considered for the site, parameter distributions, associated references for the development of distributions, and proposed methodology, must be submitted to the RPM prior to the conduct of the uncertainty analysis.





1. TASK 12. BASELINE RISK ASSESSMENT REPORT

i. The baseline risk assessment report is completed as a part of the RI process. The risk assessment document should be presented as a self contained, stand alone document. The overall format of the report should closely follow the outline presented as Exhibit 9-1 in the Risk Assessment Guidance for Superfund: Human Health Evaluation Manual (HHEM). In accordance with the National Contingency Plan and the HHEM, need for action at Superfund sites should be based upon an assessment of the reasonable maximum estimate of exposure (RME). Guidance for the determination of the RME is presented in chapter 6 of HHEM.

ii. Draft Baseline Risk Assessment. The draft version of the BRA will be submitted to the EPA RPM for review and comment. The draft BRA shall be submitted 45 days after receipt of the PRPs Site Characterization Report unless otherwise approved by the RPM.

iii. Final Baseline Risk Assessment. The contractor shall prepare a final baseline risk assessment report which shall incorporate EPA comments within 2 weeks of receipt of EPA comments.

m. TASK 13. PROJECT CLOSEOUT

The contractor shall begin project closeout when directed by the RPM. Project closeout activities shall be included and budgeted in the work plan.



#### IV. PERSONNEL REQUIREMENTS

- a. The Project Manager shall have a minimum of three years Superfund experience.
- b. The Project Manager shall be familiar with landfill sites, radiological isotopes, mixed waste, and gas collection systems.
- c. The Project Manager shall have knowledge regarding landfill remediation and/or landfill design.
- d. The Project Manager or Project Team shall have a technical expert in hydrogeology.
- e. Personnel performing field oversight shall have at least 2 years of "hands-on" field experience in the technology being monitored/overseen.
- f. The project team shall have an expert hydrogeologist familiar with landfills.
- g. The project team shall have a person familiar with methane gas collection systems.
- h. The project team shall consist of a toxicologist or equivalent with expertise in developing a risk assessment with radiological isotopes and chemical wastes (i.e., mixed waste).
- i. Personnel performing the baseline risk assessment interim deliverables, draft bra, and final bra shall be a toxicologist or equivalent with at least 2 years experience with the EPA's BRA requirements.



V. DELIVERABLES

a. TASK #1 - Work Plan must be submitted for review per contract requirements. The work plan is due upon 30 days of WA issuance.

b. TASK #2 - Project Management activities must be performed according to contract requirements.

c. TASK #3 & #4 - Site File Summary Report shall be submitted 15 days upon work plan approval.

d. TASK #5 - Notes or meeting minutes must be submitted to the RPM within 3 days from conclusion of meetings or conference calls.

e. TASK #6 - Letter report shall provide technical comments regarding the documents submitted for review by the RPM. The Letter report shall be submitted by the contractor within 15 days upon receipt of documents or as approved by the RPM.

f. TASK #7 - Trip reports shall be provided with all field notes, photographs, etc. as described under Task 7. ASR forms and addenda to QAPP shall be submitted prior to field oversight activities. Site visits will be scheduled at the request of the RPM. Trip reports shall be submitted to the RPM within 2 weeks of the site visit.

g. TASK #9 - The Site Conceptual Model shall be submitted 10 days after receipt of the PRPs Site Characterization Report. The Summary report and tables providing the information requested for Task 9 part ii and iii which shall be submitted 15 days after receipt of the PRPs Site Characterization Report.

h. TASK #10 & 11 - Summary report and tables providing the information requested in Task 10 part i, ii and iii and Task 11 parts i and ii. The report can be submitted with Task #9 deliverable including the Chemicals of Concern List and Rationale. The report shall be submitted 15 days after receipt of the PRPs Site Characterization Report.

i. TASK #12 - Draft Baseline Risk Assessment shall be completed within 45 days after receipt of PRPs Site Characterization Report. The Final Baseline Risk Assessment shall be submitted within 2 weeks upon receipt of EPA's comments on Draft BRA.

j. TASK #13 - Closeout of the WA shall be performed in accordance with the contract.

VI. GOVERNMENT-FURNISHED EQUIPMENT AND OTHER RESOURCES



- a. The AOC for the RI/FS with attached SOW for the West Lake Landfill Radiological Areas 1 and 2 is provided. (Attachment 1)
- b. The PRPs Summary of Deliverables required submittals in accordance with the AOC and SOW. (Attachment 2)
- c. The Generic QAPP for oversight is provided as an attachment. (Attachment 3)

## VII. REPORTING REQUIREMENTS

- Monthly Status Reports
- Formal written notice to the Contracting Officer with copies to the Project Officer and the WAM is requested when this work assignment expends 75% of its authorized budget.





ATTACHMENT 2

PRPs SUMMARY OF DELIVERABLES

The following is a table summarizing the RI/FS PRPs' deliverable documents to be submitted in accordance with the AOC and SOW.

TASK/DELIVERABLE

EPA ACTION

TASK I - WORKPLAN DEVELOPMENT

TASK II - SCOPING

• Work Plan:

Draft RI/FS Work Plan

Review and Comment

Final RI/FS Work Plan

Review and Approve

Draft Sampling and Analysis Plan (SAP)

Review and Comment

Final Sampling and Analysis Plan (SAP)

Review and Approve

Site Health and Safety Plan

Comment

Interim Action Work Plan (if needed)

Review and Approve

TASK III - COMMUNITY RELATIONS PLAN

None

TASK IV - SITE CHARACTERIZATION

• Technical Memorandum:

Draft Interim Investigation Results

Review and Comment

Final Interim Investigation Results

Review and Approval

Modeling of Site Characteristics (if needed)

Review and Approval

• Technical Report:

Site Characterization  
Summary Report

Review and Approve

Draft Remedial Investigation (RI) Report

Review and Comment

Final Remedial Investigation Report

Review and Approve

TASK V - TREATABILITY STUDIES



- **Technical Memorandum:**

Evaluation of Need for Treatability Studies	Review and Approve
Candidate Technologies For Treatability Studies (if needed)	Review and Approve

- **Work Plan:**

Treatability Testing Work Plan (or amendment to RI/FS Work Plan, if needed)	Review and Approve
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Treatability Study SAP (or amendment to original, if needed)	Review and Approve
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Treatability Study Site Health and Safety Plan (or amendment to original, if needed)	Review and Approve
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- **Technical Report:**

Treatability Study Evaluation Report (if needed)	Review and Approve
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**TASK VI - DEVELOPMENT AND SCREENING OF REMEDIAL ALTERNATIVES**

- **Technical Memorandum:**

Refined Remedial Action Objectives	Review and Approve
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- **Technical Report:**

Development and Screening of Remedial Alternatives	Review and Approve
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**TASK VII - DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES**

- **Technical Memorandum:**

Comparison of Remedial Alternatives	Review and Approve
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- **Technical Report:**

Draft Feasibility Study (FS) Report	Review and Comment
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Final Feasibility Study (FS) Report	Review and Approve
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## **APPENDIX II**

### **RESUMES OF KEY PERSONNEL TEAM MEMBERS**



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**DAVID J. BOCKELMANN, PG**  
**Director of Environmental Investigations**

**SPECIALIZED EXPERTISE**

Hazardous waste management  
Groundwater remediation  
Site assessments/Remedial investigations/Feasibility studies

**EDUCATION**

MS in Engineering Science, Geological Engineering, University of Mississippi, Oxford, 1989  
BS in Geology, University of Missouri, Columbia, 1977

**CERTIFICATION**

OSHA Hazardous Waste Health and Safety Course (29 CFR 1910.120)  
OSHA 8-Hour Annual Updates  
Red Cross First Aid Certified/Red Cross CPR Certified

**RELATED EXPERIENCE**

Mr. Bockelmann specializes in hazardous waste project management and geological engineering for remedial investigations and feasibility studies at Superfund Sites, EPA projects, DoD projects and industrial clients. He has managed field investigation activities, designed and evaluated waste disposal/remediation options, as well as groundwater remediation options. He possesses a strong working knowledge of RCRA and CERCLA/SARA, familiarity with TSCA and extensive permitting experience.

As Deputy Program Manager for the ARCS program, Mr. Bockelmann's management experience includes coordinating resources, task order assessment, review of change orders, regulatory compliance and interpretation and responsibility for quality of deliverables. The following projects are representative of his experience:

- U.S. EPA ARCS Program, Regions VI, VII, and VIII - Deputy Program Manager for the ARCS program responsible for personnel management, quality control, project cost estimating, purchasing and overall project coordination. The 10-year program is based on a \$68-million task order contract. The following projects are part of this experience.
  - Midvale Slag Superfund Site, Midvale, UT - Project Manager for the site previously used for mine ore smelting; site contained large deposits of various types of slag. The project consisted of providing the EPA with a baseline risk assessment document and reviewing documents and work plans completed by a previous contractor
  - Midwest Manufacturing Superfund Site, Kellogg, IA - Project Manager responsible for performing RI/FS at a metal electroplating site. Work included investigating and designing the remediation of metal-contaminated sludge, and metals and chlorinated solvent-contaminated groundwater. Primary contaminants were cadmium, zinc, trichloroethylene and vinyl chloride
  - Gulf Coast Vacuum Services Superfund Site, Abbeville, LA - Project Manager performing an RI/FS at an oilfield waste disposal facility that included several disposal lagoons, above ground holding tanks and underground storage tanks. Primary contaminants were heavy metals and petroleum hydrocarbons
  - Tenth Street Superfund Site, Columbus, NE - Project Manager responsible for performing a RI/FS for city groundwater supply wells contaminated with chlorinated solvents. Project consisted of the collection of soil samples and the installation of 34 groundwater monitoring wells to determine the source and extent of contamination as well as the development of remediation options. Project required close coordination with federal, state, and city officials including the development of a Community Relations Plan and providing community relations support





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**DAVID J. BOCKELMANN, PG**  
(Continued)

**RELATED EXPERIENCE (Continued)**

- Confidential Client, Southwest, KS - Project Manager for a confidential client in Kansas to investigate three deep (600 feet) industrial water supply wells contaminated with chlorinated solvents. Investigation included coordination with state, city and county officials to determine the source of contamination
- Times Beach Superfund Site, I-44 Corridor Remediation and Site Demolition, Times Beach, MO - Project Engineer and Hydrogeologist responsible for technical support and design review for the design of a demolition landfill. The project was completed on a fast-track schedule, 10 months from notice-to-proceed
- Los Angeles District Indefinite Delivery Order Contract, Los Angeles, CA - Project Engineer and Hydrogeologist for technical review of task assignments and preparation of project approach. The approach had to address ways to establish/confirm existing problems (mainly tank evaluations) in a manner consistent with established methods
- Confidential Food Processing Client Site Remediation - Project Hydrogeologist for site assessment/site evaluation to investigate whether nearby sites might pose an environmental threat. Evaluated the large Superfund Site to see if the groundwater was contaminated and if the client facility was a contributing cause
- Iowa Department of Transportation, Burlington, IA - Project Executive/Project Engineer for the investigation, remediation, and disposal of Mississippi River Bed sediments that were found to be contaminated with coal tar compounds. Provided the Iowa DOT with plans for the investigation, excavation, stabilization, storage, transportation, and disposal of the contaminated sediments. Responsible for meeting all contractual requirements and overseeing the development of all technical plans
- Omaha District USL/AIM Superfund Site Remediation, Troy and Arcanum, OH - Project Engineer and Hydrogeologist responsible for reviewing and planning scope of investigation, and for developing detailed project approach. Submitted revised scope of work, which reduced the number of samples and monitoring wells necessary for the project, resulting in significant cost savings
- Mississippi Department of Environmental Quality - Environmental Administrator responsible for overseeing all aspects of groundwater reviews and investigations conducted at RCRA sites (including several RCRA Facility Investigations), CERCLA sites, and other sites throughout Mississippi. Also served as Program Administrator for site groundwater remediation and as Chief of the Hazardous Waste Hydrogeology Branch
- Hazardous Waste Permit Writing - Environmental Scientist responsible for writing hazardous waste permits and for performing technical reviews of hazardous waste treatment, storage, and disposal facilities under the RCRA program. These included review of groundwater monitoring systems to assure compliance with state and federal regulations; determination of monitoring well design capability for detecting contamination; examination of the hydrogeologic characteristics of hazardous waste land treatment and land disposal sites; and review/approval of groundwater assessment plans, corrective action plans, and RCRA Facility Assessment/RCRA Facility Investigation Plans for Solid Waste Management Units

**PROFESSIONAL BACKGROUND**

Entered the profession in 1977; joined Sverdrup in 1989

Member of the National Groundwater Association - Association of Groundwater Scientists and Engineers



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**ROBIN R. RODRIGUEZ**  
Soil Scientist

**SPECIALIZED EXPERTISE**

Soil research and laboratory testing  
Environmental sampling

**EDUCATION**

MS in Soil Science, Utah State University, 1981  
BS in Soil Science, Utah State University, 1979

**CERTIFICATION**

OSHA Hazardous Waste Health and Safety Course (29 CFR 1910.120)  
OSHA 8-Hour Annual Updates

**RELATED EXPERIENCE**

Bioremediation of environmental contaminants is an area of specialization for Ms. Rodriguez. She has successfully completed the following professional training courses:

- Bioremediation of Hazardous Waste Contaminated Soils, Division of Environmental Engineering, Utah Water Research Laboratory, Utah State University, Logan, Utah, August 1992
- Bioremediation Engineering, General Physics Corporation, Columbia, Maryland, July, 1991

Her representative project experience includes:

- U.S. EPA ARCS Program, Regions VI, VII, and VIII, Utah Power and Light/American Barrel Superfund Site, Salt Lake City, UT - Project Manager responsible for the development of the Baseline Risk Assessment and Record of Decision. This project required the ability to evaluate environmental sample data and assess impacts from contaminants at the site to quantify risks
- U.S. EPA ARCS Program, Regions VI, VII, and VIII, Midvale Slag Operable Unit 1 Superfund Site, Midvale, UT - Project Manager responsible for the development of the Baseline Risk Assessment
- U.S. EPA ARCS Program, Regions VI, VII, and VIII, Gulf Coast Vacuum Services, Inc. Superfund Site, Vermilion Parish, LA - Project Engineer for the Remedial Investigation/Feasibility Study. Performed extensive environmental sampling at the site to collect contaminated soil, surface water, surface sediments, groundwater, lagoon sludge, and tank liquids and solids. Responsible for data evaluation following CLP guidelines. Interpretation of the data resulted in an understanding of the effects of contamination sources on the environment, which was subsequently written into the RI report. This project provides a working experience in regard to the fate and behavior of a variety of contaminants, including PAHs, heavy metals, hydrocarbons, etc.

**Representative Projects for Others**

Ms. Rodriguez has extensive experience in soil chemistry research, as well as related environmental projects including laboratory testing and analysis.

- Soil Test Laboratory, University of Missouri, MO - Supervisor responsible for coordination of all laboratory activities, planning, assigning, and selection and review of staff, and selection and purchasing of all laboratory materials, chemicals, and equipment. Experience included spectrophotometric, turbidimetric, and potentiometric methods, as well as atomic absorption spectroscopy, ion selective electrodes, and auto-analyzers
- Utah Water Resources Laboratory, Logan, UT - Research Laboratory Technician responsible for water quality analysis, algal bioassay, and wastewater treatment research using GC techniques



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**ROBIN R. RODRIGUEZ**  
(Continued)

**RELATED EXPERIENCE (Continued)**

**PUBLICATION**

Rodriguez, R.R. 1990, "Fungal Biodegradation of Lignin - Like Pollutants." Proceedings of the 1990 Environmental Engineering Specialty Conference, American Society of Civil Engineers

**PROFESSIONAL BACKGROUND**

Entered the profession in 1982; joined Sverdrup in 1991

Member - Soil Science Society of America

- International Soil Science Society
- American Institute of Biological Sciences

Student Member - American Society of Civil Engineers

- Society of Women Engineers



ROBERT M. LOWY, P.G.

EDUCATION:

M.S., Civil (Environmental) Engineering, University of New Mexico, 1988  
M.S., Geology, University of New Mexico, 1982  
B.S., Geology, Rensselaer Polytechnic Institute, 1972  
EPA Personnel Protection and Safety (165.2)  
EPA Incident Mitigation and Treatment Methods (165.3)  
AHERA Management Planner (certification pending)

EXPERIENCE:

Corporate Affiliations: LATA, 1990 - present  
Roy F. Weston Inc., 1985 - 1990  
N.M. Environmental Improvement Division, 1982 - 1985  
University of New Mexico, 1978 - 1982  
U.S. Geological Survey, 1977 - 1978  
Kerr-McGee Corporation, 1976 - 1977

Areas of Specialization: Project Management  
Facility Decontamination and Decommissioning  
Hydrogeology & Aqueous Geochemistry  
Groundwater and Soil Remedial Design  
Effluent Treatment System Design  
Mixed Waste Management  
Computer Modeling of Groundwater Systems

Years of Experience: 16

Certification/Licensing: USDOE "Q" Clearance - Active at LANL and Mound  
Registered Professional Geologist, North Carolina (#830)  
OSHA 40-hr Certification-Level B Worker/Level C Supervisor

Qualifications Summary:

Mr. Lowy has extensive experience in environmental engineering, hydrogeology, and geochemistry. His experience includes safety evaluations of facility expansion, decontamination, and decommissioning workplans; designs for BAT liquid effluent systems; development of OSHA compliance programs; and preparation of site characterization workplans, feasibility studies for corrective action, remedial alternative designs, and standard operating procedure documents for RCRA and CERCLA/SARA assignments. He has also completed geochemical and hydrogeologic evaluation of groundwater basins, aquifer systems, and contaminant plumes which have included flow and solute-transport modeling.

Experience as a LATA Employee:

As a Project Leader/Engineer under contract to Westinghouse Hanford Company- Hanford Site (WHC-Hanford) and the EG&G Mound Plant, Mr. Lowy participates in the preparation of safety analysis documents. Major projects for WHC include the Preliminary Safety Evaluation and Hazard Classifications for WRAP-2 facility, decontamination and decommissioning (D&D) of the Strontium Semi-Works facility, and the RCRA 90-day Waste Storage Pad. Major projects for EG&G-Mound





Robert M. Lowy (continued)

include the Safety Evaluations for D&D activities at the SW-8 Tritium Separation Room, SW Cave and ancillary Rooms, SW Building Surplus Rooms, R-140 Plutonium Laboratory, the WD-Annex, and a Safety Analysis for D&D of the SM Building and Soils Excavation.

As a Project Engineer under contract to WHC-Hanford, Mr. Lowy completed numerous studies of treatment options and best available technology (BAT) studies for treating liquid effluent waste streams. The effluent waste streams included mixed radioactive and nonradioactive-hazardous components fuel processing facilities, liquid waste storage facilities (tank farms), and waste concentrator (Evaporator) facilities. Specific tasks included evaluation of current and historic operational practices, effluent quality, and disposal alternatives; development of treatment system alternatives; and economic analyses. Facilities requesting these services have included the PUREX Plant, 200-East Tank Farms, and Project C-018.

As a Project Engineer on the WHC-Hanford Facility Effluent Monitoring Plans (FEMP) Program, Mr. Lowy participated in characterization efforts for liquid effluent wastestreams, completed portions of FEMP-determination reports, and identified monitoring deficiencies with respect to EPA requirements. Facilities requesting these services included the PUREX Plant and UO3 Plant.

#### Experience as a WESTON Employee - Public Sector:

Mr. Lowy was the Task Leader for a DOE/ER program at Los Alamos National Laboratory (LANL), where he prepared reconnaissance work plans for preliminary assessments and investigations of suspected waste disposal sites in residential and commercial areas of Los Alamos (Townsites). The sites in question were formerly operated by LANL, but are now privately owned. The Townsites reconnaissance program included community relations concerns, as well as technical investigations.

As Site Manager for a DOE/ER program at Sandia National Laboratories, Mr. Lowy prepared an installation generic monitoring plan, remedial investigation and feasibility study plan, and compliance verification plans for radioactive disposal sites, explosive testing areas, chemical disposal pits, and landfills in four technical experimentation areas. Plans include specifications for groundwater monitoring, surface water sampling, vadose zone moisture monitoring, soil-gas surveys, surface geophysical surveys, and geotechnical evaluations. Other tasks were to describe the contaminant sources and vadose zone contamination, predict the rate of migration to a deep aquifer, and investigate interaction between vadose zone and surface water migration routes. Mr. Lowy also supervised field sampling at selected sites.

Mr. Lowy was Task Leader for the USEPA ARCS IX programs for American Crossarm and Conduit, Chehalis, WA, and the Harbor Island Investigation, Seattle, WA. He prepared RI/FS work plans for facilities known to be contaminated by lead, petroleum sources, PCP, creosote, and polynuclear aromatic hydrocarbons. Plans included specifications for groundwater monitoring, surface water sampling, surface geophysical investigations, and soil sampling. For the American Crossarm project, he authored a field sampling plan and contributed to strategy for location and frequency of sampling.

As a Project Engineer for a DOE/ER program at the Mound Plant and for the DOI/BLM Lee Acres RI/FS, he provided technical input and senior reviews of feasibility studies and reports related to the removal, treatment, and disposal of contaminated soils. At Mound, the soils were contaminated by plutonium (the Canal site); at Lee Acres, the soils were contaminated by nonradioactive hazardous materials. Mr. Lowy's tasks included assembly/screening of remedial alternatives, risk assessment, and selection of preferred alternatives.



Robert M. Lowy (continued)

As Project Engineer for the DOI/BLM Preliminary Assessment and Site Inspection (PA/SI) Program, Mr. Lowy developed workplans and an analytical program for reconnaissance and inspections at four R&PP landfills within New Mexico. He administered the budget and field activities, wrote final reports, and prepared the Hazardous Ranking System (HRS) score and documentation. Results of the study were alternatives for landfill closure and remediation.

As Principal Engineer for the DOI/BLM Lee Acres Landfill Site Investigation and subsequent RI/FS/EIS, Mr. Lowy contributed to the preparation of community relations plans; public scoping meetings; data quality objectives/ARAR working papers; source identification/PRP search work plans; and remedial investigation sampling and analysis work plans. He reviewed and approved subcontractor invoices and deliverables and directed operations to ensure document control, quality assurance/quality control, and budgetary controls. He reviewed and evaluated analytical data, data management, and data interpretations.

As Hydrogeologist for the DOI/BLM Lee Acres Landfill Site Investigation, Mr. Lowy coordinated groundwater investigations of the vadose zone and shallow aquifer underlying a landfill in Farmington, New Mexico. Using geophysical survey, soil gas, and water quality data, he delineated the configuration of the plume and evaluated impacts of migration of industrial chemicals and oil-production brines from unlined liquid disposal cells. He described mixing interactions between contaminant plumes emanating from the landfill and a neighboring oil refinery.

Mr. Lowy was the Site Hydrogeologist for the DOE-UMTRA RI/FS at Rifle, Colorado. He performed hydrogeological and geochemical characterization of the aquifer systems underlying two abandoned uranium mill tailings impoundments and four liquid waste ponds. He evaluated impacts associated with removal of tailings to an alternate location and performed site selection and hydrogeochemical evaluation of three alternate land-disposal facilities. Remedial action design included groundwater contaminant recovery and treatment by reverse osmosis techniques as well as long-term pile stabilization. The project required information exchange with the DOE, local citizenry, and State of Colorado regulatory agencies for radiation and groundwater protection.

#### Experience as a WESTON Employee - Private Sector:

As an Environmental Remediation specialist under contract to Lockheed Aeronautical Systems Co., Mr. Lowy provided technical direction and prepared the soil remediation master strategy plan for a CERCLA investigation. He formalized investigation decision strategies, described multi-disciplinary investigation plans, developed soil cleanup criteria, and assembled and screened remedial technologies, process options, and remedial alternatives. Mr. Lowy has participated in included mixed waste, radioactive, organic chemical, toxic metals, and PCB contamination for diverse industries.

As Principal Hydrogeologist under contract to the Prager Electrical Generating Station, Albuquerque, New Mexico, Mr. Lowy wrote and presented a successful technical and cost proposal for soil sampling and groundwater investigations at an inactive electrical power generating station. Suspected contamination included PCBs, volatile organic hydrocarbons, heavy metals, and petroleum derivatives. Mr. Lowy assembled a team for preparation of work plans and supervised field tasks. He maintained budgetary control and client liaison and prepared progress reports and approved subcontractor invoices.

Mr. Lowy was a Project Engineer for a hydrogeologic and soils remedial investigation at a facility (Confidential Client) with organic solvent, radioactive, and PCB contamination. He prepared statements of work and coordinated activities with subcontractors and administered budgetary allocations. He prepared four characterization reports describing soil-gas surveys, soil contamination by organics and RCRA metals, and hydrogeology at the facility for presentation to the Nuclear Regulatory Commission.



Robert M. Lowy (continued)

Mr. Lowy was Project Hydrogeologist for a remedial investigation of a facility with leaking underground gasoline storage tanks for a major West Coast Insurance company. He supervised installation of groundwater monitoring wells, collected samples, and delineated contaminant plumes for floating product and dissolved organic constituents. He estimated the rate and direction of contaminant migration based on potentiometric maps and aquifer characteristics. The remedial action design included removal of five tanks and groundwater treatment by air stripping.

Experience as a N.M. Environmental Improvement Division Employee:

Mr. Lowy was Program Manager for RCRA 3012 and CERCLA (Superfund) programs for the New Mexico Environmental Improvement Division and the Environmental Protection Agency. He was health and safety officer at field investigations, developed QA/QC and site safety/sample plans, and supervised and assisted the field investigation team. He performed field evaluation of containment, treatment, and disposal practices for organic, inorganic, heavy metals, PCB, and radioactive wastes. Of the HRS packages that he prepared, two HRS rankings passed EPA QA/QC reviews for inclusion on the National Priorities List (NPL) and three additional packages are pending final approval and/or follow-up requirements. This position required frequent interaction with the EPA, contract laboratories, and emergency response teams. Mr Lowy completed over 40 preliminary assessments, 30 site inspections, and 4 sites inspection follow-ups.

Experience as a U.S. Geological Survey Employee:

As a Hydrologist for the USGS/BIA Four Northern Pueblos Groundwater Resource Assessment, Mr. Lowy performed a hydrogeologic verification for physical boundary constraints using a three-dimensional, finite-difference computer simulation. He investigated hydraulic properties of an unconsolidated sand and volcanic ash aquifer. He supervised pumping tests and used the resulting data to predict hydrologic properties of the aquifer system.

Experience as a Kerr-McGee Corp. Employee:

As an Exploration Geologist, Mr. Lowy coordinated drilling programs and supervised surface reclamation of drill sites. He interpreted geophysical electric logs and prepared lithologic cross-sections and structure contour maps. He described the stratigraphy of sites from drill cuttings and core.



Robert M. Lowy (continued)

Publications and Presentations:

Lowy, R. M., and B. M. Thomson, "In-situ Aeration for Stripping Volatile Organic Contaminants from Shallow Ground Water Systems," Specialty Conference Proceedings, 1988 Joint CSCE-ASCE National Conference on Environmental Engineering, June 13-15, Vancouver, B.C., Canada, 1988.

Lowy, R. M., "Site Investigations Reconnaissance, Initial Entry, and Site Control, in Surveillance of Organic Contamination of New Mexico's Groundwater," New Mexico Health and Environment - Environmental Improvement Division Short Course, Albuquerque, New Mexico, 1984.

Lowy, R. M., and D. G. Brookins, "Provenance and Sediment-Dispersal Patterns of Westwater Canyon Sandstones in the San Juan Basin," presented at Geological Society of America Symposium: Geology of the San Juan Basin, 1984.

Lowy, R. M., and C. Baird, "Comparison of Braided-Stream Depositional Environment and Uranium Deposits at St. Anthony Underground Mines," New Mexico Bureau of Mines and Mineral Resources Memoir 38, 1980.

Lowy, R. M., R. T. Hicks, et al., "Petrology of Westwater Canyon Member, Morrison Formation, East Chaco Canyon Drilling Project, New Mexico - Comparison with Grants Mineral Belt," New Mexico Bureau of Mines and Mineral Resources Memoir 38, 1980.

Lowy, R. M., K. Hannaford, et al., "Hydrogeology and Dissolution History of Alabaster Cave, North-Central New Mexico," Cave Research 1978 Annual Report, 1979.





Robert M. Lowy (continued)

Professional Societies and Honors:

Association of Groundwater Scientists and Engineers (NWWA).  
American Society of Civil Engineers (ASCE).  
American Society for Testing and Materials (ASTM).  
International Association of Hydrological Sciences

Professional References:

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## WESLEY L. BRADFORD

### EDUCATION:

Ph.D., Earth Sciences and Environmental Engineering, The Johns Hopkins University, 1972  
M.S., Chemical Oceanography, Analytical Chemistry, and Chemical Thermodynamics, Oregon State University, 1968  
B.S., Chemistry, Physics, and Mathematics, 1966

### EXPERIENCE:

Corporate Affiliations: LATA, 1990 - present  
Versar, Inc., 1985 - 1990  
U.S. Geological Survey, 1975 - 1985 and 1972 - 1973  
URS Research Co., 1973 - 1975  
The Johns Hopkins University, 1968 - 1972

Areas of Specialization: Hazardous waste management  
Hydrogeology and hydrology  
Remedial Investigation/Feasibility study  
Environmental analysis  
Regulatory compliance (RCRA, CERCLA, CWA, NEPA)  
Remedial Design/Remedial Action

Years of Experience: 26

Certification/Licensing: Certified Professional Hydrologist, American Institute of Hydrology, 1985  
California Engineer-in-Training, 1975

### Related Experience:

Dr. Bradford has 20 years of professional experience in conducting field investigations in hydrology, hydrogeology, and geochemistry, as well as environmental contamination assessments, remedial investigations and feasibility studies, and RCRA corrective actions at industrial facilities and landfills. He has worked with industry and the military on hazardous waste management, waste minimization in process streams, assessment of environmental contamination, and evaluation of compliance issues with respect to RCRA, CERCLA and NEPA. He has also designed and operated surface and groundwater monitoring programs, performed resource appraisals, participated in audits of DOE projects and facilities, developed data management systems, and developed and tested field and laboratory instrumentation. He is currently senior hydrogeologist and manager of environmental programs at LATA, providing management and technical support to several projects and marketing efforts involving RCRA, CERCLA and NEPA compliance, audits of DOE and DoD facilities, and contamination assessment.

Since joining LATA, Dr. Bradford has managed and/or assisted in several projects including:

- Development and testing of a prototype electrochemical method for water sterilization, including evaluation and marketing of additional application for the method.
- Reviewed and evaluated RI/FS and NEPA compliance efforts at the DOE Weldon Springs, MO site.



Wesley L. Bradford (continued)

- Audited WIPP procedures at ANL-West analytical laboratory at INEL for WIPP WACCC, August, 1991.
- Assisted the U.S. Navy (NAVSEA) on a manual for ship defense under chemical warfare attack.
- Assisted commercial industrial clients in regulatory (RCRA) compliance including design of RCRA Corrective Actions at a major manufacturing facility, evaluated performance of a RCRA landfill groundwater monitoring program, and evaluated statistical procedures for a ground-water detection monitoring program.
- Assisted a municipality (Kansas City, KS) in evaluating design of and monitoring plans for a proposed domestic (RCRA Subtitle D) landfill, and evaluating removal action plans, associated risks, and potential liabilities at an NPL site.
- Manager of two tasks in the Sandia National Laboratories DOE TRU Waste Integration Project; one for identification of functional, performance, and regulatory requirements for the DOE TRU Waste System; and a second for review of potential impacts of DOE-site Federal Facility Compliance Agreements (FFCAs) on TRU Waste System integration.
- Member of DOE/CH Environmental Appraisal team conducting an appraisal of ANL-East, May 18-29, 1992, reviewing programs in Groundwater Protection, Inactive Waste Site Management, and Hazardous and Mixed Waste Management.
- Designed and delivered a two day NEPA training program for the DoD. The course design included a detailed instructor's guide and the preparation of a case study of an actual EIS for classroom instruction.
- Co-authored a NEPA Compliance Manual for publication by Government Institutes Press.
- Managed a program to develop standardized methods of environmental impact analysis in support of NEPA documents.

Dr. Bradford was program manager for a number of studies at Versar, including a study to characterize chemical residues from municipal waste combustors; two major remedial investigation/feasibility studies (RI/FS) for commercial clients under CERCLA enforcement; investigations and characterizations of waste streams and their potential impact on the environment; evaluation of landfill designs and assessment of potential for contamination from landfill leachates; soil, surface water and groundwater contamination; development and implementation of groundwater monitoring plans and facility closure plans; Remedial Design/Remedial Action at NPL sites; and groundwater monitoring compliance assessment tasks for technical enforcement support contracts with EPA. As senior hydrogeologist at Versar, Dr. Bradford was senior investigator and technical reviewer for numerous studies and provided expert testimony in cases involving groundwater contamination, general chemistry and geochemistry, and scope of remediation. He also developed new techniques of investigation and remediation. Examples of such projects include the following:

Manager and principal investigator, RI/FS for the Buckeye Reclamation Landfill NPL site, St. Clairsville, OH, including RI, EA and FS reports for a commercial client.

Manager and principal investigator, RI/FS for the Blackstone Valley/Peterson-Puritan NPL site, Cumberland, RI, including planning and field investigations and interim reports for a commercial client.



Wesley L. Bradford (continued)

Task manager for hydrogeologic investigations, RI/FS for the Denver Radium Site Operable Unit VIII, Denver, CO. Supported preparation of work plans, QAPP, and sampling and analysis plan for the State of Colorado.

Manager and principal investigator, technical review of hydrogeologic aspects of an EPA-sponsored RI/FS for a commercial client to determine liability for groundwater contamination by chlorinated hydrocarbons.

Manager for two projects involving Remedial Design/Remedial Action at NPL sites in Michigan.

Manager and Principle Investigator for studies of waste minimization by solvent recovery from chemical process streams for a commercial client.

Principal investigator for preparation of RCRA delisting petitions and closure plans for commercial clients, resulting in successful petitions and approved plans.

Manager and principal investigator for preparation of data analysis plan for a RCRA Subpart X unit and assistance in EPA-commercial client negotiations.

Manager and principal investigator for projects to assess the impact of storage tank leakage on groundwater and soils.

Management and technical review support for RCRA groundwater monitoring compliance inspections, site/sampling investigations, comprehensive monitoring evaluations, and detailed review of remedial investigations for EPA.

Statistical analysis of water quality effects and loadings from agricultural and forested areas in the Monocacy River Basin, MD, for the State of Maryland.

Property transfer audits and follow-on remediation of contaminated soil and groundwater, including contamination by petroleum hydrocarbons and by pentachlorophenol.

Assessing CERCLA responsibility and potential liability at properties being considered for purchase by individuals, banks, and real estate companies.

As hydrologist and assistant chief of the Quality of Water Branch, Headquarters, U.S. Geologic Survey (USGS), Water Resources Division (WRD), Dr. Bradford coordinated a new thrust program dealing with toxic substances in surface water and sediment and assisted in the development of the National Acid Deposition Program national monitoring program. He performed management and executive duties and represented the Branch at the levels of senior staff, bureau director, and Department of the Interior on matters related to water quality program development, planning, and management. He also reviewed NEPA documents (EAs and EISs) prepared by other Federal agencies and submitted to the USGS as agency with special expertise. Also as hydrologist he advised the branch chief on all matters related to the geochemistry of surface and groundwater, served on committees that recommended national policy and procedures for data collection, coordinated training courses in water quality specialties, and coordinated and conducted technical reviews of field activities.

As Water Quality Specialist with the USGS, WRD California District, Dr. Bradford managed a water quality data collection program and was advisor for numerous water resources projects. He developed new programs in applied water resources research in the State of California.

As a water quality engineer with URS Research Company, he performed research in water quality and environmental chemistry, participated in preparation of Environmental Impact Statements





Wesley L. Bradford (continued)

including the EIS for the Army Corps of Engineers at the proposed Tocks Island Reservoir on the Delaware River north of Trenton, NJ and conducted area-wide water quality planning studies.

As a postdoctoral fellow, Dr. Bradford studied the occurrence and movement of trace metals in San Francisco bay. He obtained the first mass balance for zinc in that portion of the bay. As a research assistant at the Chesapeake Bay Institute at The Johns Hopkins University, he developed new techniques for analysis of zinc in estuarine and sea water and studied the distribution and movement of zinc and other heavy metals in Chesapeake Bay. He assisted in design and location of a cooling water outfall from a proposed nuclear power plant on the Florida coast. Earlier research projects also involved analysis of metals in water and sediment and design of specialized electrochemical components.



Wesley L. Bradford (continued)

Publications:

Bradford, W. L., 1968, Calcium Analysis in Seawater by an Ion Sensitive Electrode, Masters Essay, Oregon State University, Department of Oceanography, Corvallis.

Bradford, W. L., 1972, A Study of the Chemical Behavior of Zinc in Chesapeake Bay Using Anodic Stripping Voltammetry, Chesapeake Bay Institute, The Johns Hopkins University, Technical Report 76, Reference 72-7 (Doctoral Dissertation same title).

Carpenter, J. H., W. L. Bradford, and W. Grant, 1975, "Processes Affecting the Composition of Estuarine Waters ( $\text{HCO}_3$ , Fe, Mn, Zn, Ni, Cr, Co, and Cd)," Proceedings of the 2nd International Estuarine Conference, October 15, 1973, Myrtle Beach, Florida, Cronin, L.E. (ed), pp. 188-216, Academic Press, New York.

Bradford, W. L., 1973, "The Determination of a Stability Constant for the Aqueous Complex  $\text{Zn}(\text{OH})$ , Using Anodic Stripping Voltammetry," Limnol. Oceanogr. 18(5): 757-762.

Bradford, W. L., 1976, "Urban Stormwater Pollutant Loadings: A Statistical Summary Through 1972," J. Wat. Poll. Contr. Fed., 49(4): 613-622.

Bradford, W. K., and D. J. Maiero, 1987, "Lake Process Models Applied to Reservoir Management," J. Env. Eng. Div., Am. Soc. Civil Eng., 104(EE5): 981-996.

Bradford, W. L., and L. E. Glysson, 1977, "An Evaluation of Methods for Field Calibration of Portable Dissolved Oxygen Meters," U.S. Geological Survey, Administrative Report, Menlo Park, CA.

Bradford, W. L., 1980, "Compositional Variations with Season and Logging History in Streams of the Redwood Creek Drainage Basin, Redwood National Park, California," Proceedings, 2nd Conference on Scientific Research in the National Parks, Nov. 26-30, 1979, San Francisco, CA, Am. Inst. Biol. Sci., NTIS PB81-100067, Physical Sciences, pp. 557-614.

Bradford, W. L. and R. T. Iwatsubo, 1980, "Water Chemistry of the Redwood Creek and Mill Creek Basins, Redwood National Park, Humboldt and Del Norte Counties, California," U.S. Geological Survey Water-Resources Inv. 78-115.

Bradford, W.L. and R. T. Iwatsubo, 1984, "Water Quality Variation with Season and Logging History in Streams of the Redwood Creek Basin, Redwood National Park, California," Dynamic Responses of Redwood Creek Watershed to Recent Changes in Erosion Rates: U.S. Geological Survey Professional Paper (in press).

Bradford, W. L. and R. T. Iwatsubo, 1979, "Design of a Primary Monitoring Network for Water Quality in San Francisco Bay, California," Establishment of Water Quality Monitoring Programs, Proceedings of the Am. Wat. Res. Assoc. Conf., June 12-14, 1978, San Francisco, CA, Everett, L.G. (ed), pp. 20-35, AWRA, Minneapolis.

Bradford, W. L. and R. T. Iwatsubo, 1980, "Results and Evaluation of a Pilot Primary Monitoring Network, San Francisco Bay, California, 1978," U.S. Geological Survey Water Resources Inv. 80-73.

Bradford, W. L. and S. N. Luoma, 1980, "Some Perspectives on Heavy Metal Concentrations in Shellfish and Sediment in San Francisco Bay, California," Contaminants and Sediments, Vol. 2, Proceedings of a Symposium on Sedimentation and Contamination of Water Systems, Am. Inst. Chem. Eng., 72nd Annual Meeting, Nov. 25-29 1971, San Francisco, CA, Baker, R. A. (ed), pp. 501-532, Ann Arbor Science Publications, Ann Arbor, MI.



Wesley L. Bradford (continued)

Bradford, W. L., and A. J. Horowitz, (editors), 1988, The Role of Sediments in the Chemistry of Aquatic Systems—Proceedings of the Sediment Chemistry Workshop, February 8-12, 1982. U.S. Geological Survey Circular 969.

Bradford, W. L. and Jeff Flanzenbaum, 1991, Application of Leaching Algorithms and Worst-Case Analysis to Assessment of Risk to Ground Water from Contaminated Soil; Proceedings of the Eighth International Conference on Chemistry for Protection of the Environment, Lublin, Poland, September 16-18, 1991.

Bradford, W. L. and J. N. Richards, 1991, Evaluation of Non-Point Sources of Surface Water Contamination and Implications for Watershed Management; Poster Sessions, Proceedings of the Eighth International Conference on Chemistry for Protection of the Environment, Lublin, Poland, September 16-18, 1991.

Hoppe, R. K. and W. L. Bradford, 1991, Water Disinfection Using LATA's MIXOX System, Proceedings of the Second International Conference on the Disinfection of Water with a Mixture of Oxidants Generated On-Site, Mexico City, Mexico, November 5-8, 1991.

Hoppe, R. K. and W. L. Bradford, 1992, Poster Session Proceedings of the International Conference on Water Disinfection, Washington, D.C., August 29 - September 2, 1992.

Miller, R. L., W. L. Bradford, and N. E. Peters, 1988, "Specific Conductance: Theoretical Considerations and Application to Analytical Quality Control," U.S. Geological Survey Water-Supply Paper 2311.

Eccles, L. A., and W. L. Bradford, 1976, "The Distribution of Nitrate in Ground Water at Redlands, California," U.S. Geological Survey, Water Resources Inv. 76-117.

Fishman, M. J., and W. L. Bradford (eds), 1982, "A Supplement to Methods for Determination of Inorganic Substances in Water and Fluvial Sediments," USGS Techniques of Water-Resources Investigations, Book 5, Chapter A1, Open-File Report 82-272.

Friedman, L. C., W. L. Bradford, and D. B. Peart, 1983, "Application of Binomial Distributions to Quality Assurance of Quantitative Chemical Analysis," J. Environ. Sci. Health, A18(4): 561-570.

Klein, J. M., and W. L. Bradford, 1979, "Distribution of Nitrate and Related Nitrogen Species in the Unsaturated Zone, Redlands and Vicinity, San Bernardino County, California," U.S. Geological Survey Water Resources Inv. 79-60.

Klein, J. M., and W. L. Bradford, 1980, "Distribution of Nitrate in the Unsaturated Zone, Highland-East Highlands, San Bernardino County, California," U.S. Geological Survey Water Resources Inv. 80-48.

Klein, J. M., and W. L. Bradford, 1982, "Distribution of Nitrate in the Unsaturated Zone, and Increases in NO<sub>3</sub>-N Concentration in Rising Ground Water, Redlands-Highlands-East Highlands Area, San Bernardino California," Impact of Agricultural Activities on Groundwater, Proceedings 16th Congress of the International Association of Hydrogeologists, Prague, Czechoslovakia, September, 1982.

Klein, J. M., and W. L. Bradford, 1980, "Salinity Discharges of Return Flows to the Colorado River from Agricultural Land in Southern California," U.S. Geological Survey Water Resources Inv. 80-52.

Pickering, R. J., and W. L. Bradford, 1982, "Atmospheric Deposition Monitoring Under the National Acid Precipitation Assessment Plan," Proceedings of the Atmospheric Deposition Specialty Conference, East Central Section, Air Pollution Control Association, Detroit, MI, November, 1982, pp. 231-237.

Setmire, J. G., and W. L. Bradford, 1980, "Quality of Urban Runoff, Tecolote Creek Drainage Basin, San Diego County, California," U.S. Geological Survey, Water Resources Inv. 80-70.



Wesley L. Bradford (continued)

Smith, J. L., N. H. Berg, W. L. Bradford, K. J. Brown, J. W. Menke, and M. J. Singer, 1979, "Evaluation of the Potential for Weather Modification to Alter Inputs of Solids and Dissolved Chemical Constituents within a Watershed," Proceedings of a Workshop held at Berkeley, CA., U.S. Forest Service, Pacific Southwest Range Experiment Station, September 5-8, 1978.

U.S. Department of the Interior, Fish and Wildlife Service, 1982, "Effects of Acid Precipitation on Aquatic Resources: Results of Modeling Workshop," Air Pollution and Acid Rain Report No. 12; FWS/OBS-80/40.12 (participant in the workshop).

#### QUALITY OF WATER BRANCH TECHNICAL MEMORANDA - U.S. GEOLOGICAL SURVEY

The technical memorandum is the vehicle by which information and instructions regarding policy and procedures for water quality data acquisition and storage are communicated to the USGS Water Resources Division's field and project offices. Dr. Bradford had primary responsibility for preparing the following memoranda:

- 79.10 ANALYTICAL METHODS--Recommended Procedures for Calibrating Dissolved Oxygen Meters
- 80.19 WATER QUALITY--Interim Procedures for Measuring pH in Low Conductivity Waters
- 80.26 WATER QUALITY--Preservation of Nutrient Samples by Addition of Mercuric Chloride
- 80.27 WATER QUALITY--New Parameter Codes for pH, Alkalinity, Specific Conductance and Carbonate/Bicarbonate
- 80.28 WATER QUALITY--Analytical Methods; Biochemical Oxygen Demand Carbonaceous
- 81.04 WATER QUALITY--Assignment of Parameter Codes for pH, Alkalinity, Specific Conductance and Hydroxide
- 81.11 WATER QUALITY--New Tables of Dissolved Oxygen Saturation Values
- 81.12 WATER QUALITY--Trace Metals; Questionable Values for Dissolved and Total Selenium
- 82.05 WATER QUALITY--Provisional Methods for Carbonate, Dissolved, Bicarbonate, Dissolved; and Carbonate Alkalinity
- 82.06 PUBLICATIONS--Policy on Publishing Constituents with Both Field and Laboratory Values
- 83.03 PROGRAMS AND PLANS--Technology Transfer; Quarterly Distribution of Key Citations from the Water Quality Literature (Quarterly updates in 83.09, 83.19, 84.06, 84.09, 84.13, 84.15, 85.06, and 85.08)
- 83.12 WATER QUALITY--Guidelines on Collection of Ground-Water Samples for Determination of Organic Compounds
- 84.01 EQUIPMENT--pH System of the Hydrolab 4041 Units
- 84.11 WATER QUALITY--Guidelines for Collection of Ground-Water Samples for Determination of Organic Compounds--An Update
- 85.07 WATER QUALITY--Preservation of Water Samples for Nutrient Analysis--An Update of Two Issues
- 85.09 WATER QUALITY--Guidelines on Sampling Ground Water for Determination of Organic Compounds, with Comments on Analytical Protocol

#### OTHER PUBLICATIONS--U.S. GEOLOGICAL SURVEY

Turk, J. T., and W. L. Bradford, "Preservation of Water Samples for Determination of Nutrients--Review and Summary of the Literature," distributed under Quality of Water Branch Technical Memorandum 80.20, September 20, 1980.

"Acid Rain--What We Know and Don't Know," USGS 1981 Fiscal Year Activities, Geological Survey Circular 875, pp. 93-99.

"Biological Alteration of Water Samples Enroute to the Central Laboratory--Anatomy of a Costly Mistake," WRD Bulletin, April-September, 1977, pp. 64-68.

"The Role of the Water Quality Branch," WRD Bulletin, July-December 1984.





Wesley L. Bradford (continued)

"Point and Non-Point Sources of Pollution," National Water Summary 1983—Hydrologic Events and Issues, Geological Survey Water Supply Paper 2250, pp. 51-54.

"Design of Field Sampling Programs for Water Resources Appraisals," WRD Bulletin, July-December 1985.



Wesley L. Bradford (continued)

Professional Societies and Honors:

Non-Recurring Special Achievement Award for Blue-Ribbon Committee Work, USGS/WRD, 1982  
Quality Increase for Outstanding Job Performance, USGS/WRD, 1984  
Full fellowship to West Virginia University (Benedum Foundation)  
Honor Man for Monongalia County, West Virginia, 1962  
National Water Well Association (Corporate Membership)  
American Chemical Society  
International Association of Water Pollution Research  
Water Pollution Control Federation (formerly Water Environment Federation)  
American Association for the Advancement of Science  
American Institute of Hydrology  
Phi Beta Kappa  
Phi Lambda Upsilon, Chemistry Honorary  
Sphinx, Senior Men's Honorary

Professional References:

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Mr. Lee C. McCandless  
Formerly, Versar, Inc.; presently, Woodward-Clyde Consultants  
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Dr. Ranard J. Pickering  
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Additional references on file with resume

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Supervisor/Location:



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- Ph.D. in Bionucleonics, 1976, Purdue University, W. Lafayette, IN
- M.S. in Bionucleonics, 1974, Purdue University, W. Lafayette, IN
- B.S. in Pharmacy, 1971, Albany College of Pharmacy, Albany, NY

**PROFESSIONAL CERTIFICATION/ACTIVITIES:**

- Certified Health Physicist-Comprehensive:  
American Board of Health Physics, 1983 to present.
- Registered Pharmacist:  
Vermont State Board of Pharmacy, 1972 to present.
- Member of 3 national honor and 6 professional societies.
- Authored/coauthored 35 scholarly publications and presentations in areas of Environmental Monitoring, Health Physics, Emergency Planning, and Nuclear Pharmacy.
- Authored numerous project reports with limited distribution.

**EMPLOYMENT HISTORY:**

1987 (March) to present - College of Pharmacy, Idaho State University.  
Current Title: Associate Dean and Director of Student Affairs. (Tenured)

1988 (November) to present - Director, Environmental Monitoring Program,  
Idaho State University.

1992 (September) to 1993 (February) - Interim Chairman, Department of  
Pharmacy and Administrative Sciences, College of Pharmacy.

1991 (January) to (September) Interim Chairman, Department of  
Pharmaceutical Sciences, College of Pharmacy.

1983 (January) to 1987 (February) - Environmental Group Supervisor;  
Senior Health Physicist, Environmental Group-Nuclear, Penn. Power & Light  
Company, Allentown, PA.

1976 (October) to 1982 (December) - Associate Professor; Assistant  
Professor, Univ. of South Carolina, Columbia, SC. (Tenured)

1971 to 1975 - USPHS Radiological Health Fellow; USPHS Environmental  
Toxicology Fellow, Purdue University.

1967 to 1971 - Pharmacist/Intern, Daffner Drug, Troy, NY.



#### **SELECTED COMMITTEE ASSIGNMENTS**

##### **STATE:**

Idaho Small Business Innovative Research Selection Committee  
Dose Evaluation Review & Assessment (DERA) Advisory Panel

##### **UNIVERSITY:**

Council of Academic Deans  
Task Force on Assessment of Educational Outcome  
Career Planning and Placement Advisory Committee  
Nuclear Science and Application Project  
Hazardous Waste Management Council  
Academic Standards Council (Chairman 1989 to 1991)  
Radiation Safety Committee (Chairman 1991 to present)

##### **COLLEGE:**

Executive Committee  
Curricular Affairs Committee (Chairman 1987 to 1989)  
Student Affairs Committee (Chairman 1987 to present)

#### **ORGANIZATIONAL MEMBERSHIPS:**

Health Physics Society  
Eastern Idaho Chapter - Health Physics Society (President 1992-1993)  
American Association of Colleges of Pharmacy  
American Pharmaceutical Association  
Idaho State Pharmaceutical Association  
Southeastern Idaho Pharmacy Association  
Rho Chi  
Sigma Xi  
Eta Sigma Gamma

#### **GRANTS AND CONTRACTS OBTAINED AT IDAHO STATE UNIVERSITY:**

(B.W. Graham as Principal Investigator)

"Stability, Pharmacology, and Toxicology of Drugs Used in the BNCT",  
Funded by the Idaho State Board of Education, Economic Development  
Research Grant, July 1987. With R.W. Goettach, and L.J. Fontenelle.

"Boron Neutron Capture Therapy Clinical Trials Study Program: A Proposal  
of Pharmaceutical Sponsorship", Funded by EG&G, Idaho, Inc., 1988. With  
I.W. Hillyard, and R.S. Rhodes.

"Independent Verification of the Existing Scheduled Environmental  
Monitoring Program", Funded by U.S.D.O.E. Funded through FY 1993.

"Radiological/Health Physics Services", Funded by Idaho Department of  
Health and Welfare. Funded through FY 1993.

"Review of INEL Historical Dose Evaluation", Funded by EG&G, Idaho, Inc.,  
1990.

"Radiological Air Monitoring and Sample Analysis", Funded by Idaho  
Department of Health and Welfare. Funded through FY 1993.

"Radionuclide Sample Analysis Services" Funded by Idaho Department of  
Health and Welfare. Funded through FY 1993.

"Support Services for Emergency Response Exercise TRANSAX 92" Funded by  
U.S. D.O.E. Funded through FY 1993.





STATEMENT OF EXPERIENCE:

IDAHO STATE UNIVERSITY

Associate Dean and Director of Student Affairs,  
College of Pharmacy  
February 1987 to Present

As Associate Dean, I am a primary administrative officer in the College of Pharmacy. As Director of Student Affairs I serve as the main contact for student entry into and continuance in the College of Pharmacy. I have been involved in both development and implementation of our newly developed traditional and non-traditional Pharm.D. programs in the College of Pharmacy. At different times, I have served as Interim Department Chairman for both of the Departments in the College of Pharmacy while we searched for permanent Chairs. My teaching responsibilities include the development and presentation of courses in Physical Pharmacy, Pharmacy Calculations and Nuclear Pharmacy. Other shared responsibilities include publicity and press relations and, at times, dealing with the State Legislature.

I have also been involved with the development of the undergraduate and graduate Health Physics program in the Physics Department. I teach several courses in Health Physics and serve as the Chairman of the campus Radiation Safety Committee. I am the major research advisor for two Health Physics M.S. students and have served on the examination committees of six other graduate students.

Upon arriving in Idaho, I was fortunate to secure sizable research funding for a radiation treatment research project dealing with the Boron Neutron Capture Therapy (BNCT) being developed at Idaho National Engineering Laboratory (INEL). Research ideas developed with this original funding are currently being pursued by other members of our faculty.

More recently my efforts have focused upon health physics and radiological environmental monitoring issues. Currently I direct an Environmental Monitoring Program which is funded through the Department of Energy (DOE) for the purpose of independently verifying the existing scheduled environmental monitoring program at the INEL in Southeastern Idaho. Through funding by the State of Idaho's INEL Oversight organization, we are supplying health physics and radiological analytical services and we are designing and implementing a scientifically based radiological air monitoring network for eastern Idaho.

In 1990, I served on a committee to give scientific peer review of the INEL Historical Dose Evaluation as published by the DOE. At the conclusion of that committee I was selected to serve on the Dose Evaluation Review & Assessment (DERA) Advisory Panel. The panel was formed to provide the Idaho Department of Health and Welfare with advice and recommendations concerning the health impacts to Idaho citizens from the operations of the INEL.

In January 1992, I became the principal investigator on a project to develop and implement TRANSAX 92. TRANSAX 92 was a radiological transportation emergency response exercise conducted in September 1992. The exercise involved the local Native American Tribes, local governments, the State of Idaho and the DOE.

Since moving to Idaho, I have also been a consultant to the nuclear industry through various consulting groups in the following areas: Health Physics and ALARA, Emergency Planning, Emergency Response Facilities, and Environmental Monitoring.



PENNSYLVANIA POWER AND LIGHT

Environmental Group Supervisor

July 1986 to February 1987

As Environmental Group Supervisor, I had administrative responsibility for programs including environmental and effluent monitoring, meteorological assessment, normal and emergency off-site radiological dose calculations, in-plant chemistry technical support, and nuclear emergency planning support. To accomplish these programs, I directed the activities of seven PP&L professionals and thirty consultants and contractors.

Senior Health Physicist

January 1983 to July 1986

The Radiological Environmental Monitoring Program was under my supervision. The program included a separately contracted quality control monitoring program. I also coordinated many of the Company's environmental radiological research programs and environmental modeling efforts.

I wrote and implemented a microcomputer based emergency off-site dose assessment package. I was responsible for the development of all radiological data for drill exercise scenarios and functioned as the chief radiological referee during these drills. During the Spring of 1985, I was temporarily assigned to the Nuclear Emergency Planning Group as the exercise and critique manager.

I provided technical assessment and appraisal of in-plant radiochemistry activities and effluent monitoring including post accident monitors. I also served as one of the Company's Radiological Support Managers for emergency situations.

UNIVERSITY OF SOUTH CAROLINA

Assistant/Associate Professor

October 1975 to December 1982

My primary appointment was within the College of Pharmacy where I was responsible for all instruction of material concerning Nuclear Pharmacy and Bionucleonics to undergraduate and graduate students. I was the major research and thesis advisor for graduate students in Nuclear Pharmacy. I also established and directed an operational Central Nuclear Pharmacy (seven employees) which served the city of Columbia.

As an Associate Professor in the Radiology Department of the School of Medicine, I taught radiological physics and pharmacy to medical students and residents. Concurrently, in the School of Public Health, I developed and taught graduate level courses relating to environmental and occupational health physics.

For five years I was the director of Radiopharmaceutical Services at Richland Memorial Hospital in Columbia. I helped establish the Broad License for Radioactive Materials and a School of Nuclear Medicine Technology for the hospital. I was a member of numerous college and university committees including the Radiation Safety Committee and the Faculty Senate. I was the Radiation Safety Officer for the Veterans Administration Hospital in Columbia and I served on the Isotopes Use Committee of two other local hospitals.

I was one of two non-legislators appointed by the Governor to serve with him on a committee dealing with spent nuclear fuel in South Carolina.



ROBERT W. HULL

EDUCATION:

Doctoral Studies, Environmental Engineering, Stanford University, 1984-1986  
M.S., Environmental Engineering, Stanford University, 1982  
M.S., Geochemistry and Environmental Geology, Florida State University, 1981  
Graduate Studies, Chemical Oceanography, Florida State University, 1973-1974  
B.S., Geology, Florida State University, 1973

EXPERIENCE:

Corporate Affiliations: LATA, 1992 - present  
Harding Lawson Associates 1986 - 1992  
US Air Force Reserves, 1983 - present  
U.S. Geological Survey, 1974-1986  
Florida State University, 1972 - 1978  
U.S. Air Force Security Service, 1966-1970

Areas of Specialization: Regulatory compliance (NEPA, CERCLA, RCRA, CWA)  
Remedial investigation/feasibility studies (RI/FS)  
Investigative strategy (RI/FS, risk studies)  
Assessments (RA), endangerment  
Assessments (EA), background  
Environmental chemistry/chemical analysis  
Hydrogeology  
Hazardous waste management  
Quality assurance/quality control  
Analytical laboratory auditing/data validation  
Bioenvironmental engineering

Years of Experience: 22

Security Clearance: DoD Top Secret

Related Experience:

Mr. Hull has more than 18 years of technical and managerial experience in conducting investigations for site characterizations, environmental impact studies, remedial investigations/feasibility studies, risk assessments, and resource appraisals. He has designed complex environmental database management systems, codeveloped a geochemical modeling computer code, and designed an *in situ* (downhole) liquid-gas sampler for collecting aqueous samples in high temperature and high salinity environments. He is a Principal Engineer and Environmental Program Manager at LATA, providing management and technical support on DOE and DOD programs.

Concurrently with his full-time profession, Mr. Hull serves as an officer with the US Air Force Reserves. He is currently Chief, Bioenvironmental Engineering, and Acting Chief, Military Public Health, Travis AFB, California. His work as a Bioenvironmental Engineer includes development and technical oversight of air, noise, and water pollution studies for the Department of Defense at various military installations. These studies involve the implementation of safety engineering and industrial hygiene programs of the Air Force Occupational Safety and Health Office and Installation Restoration Programs (equivalent to CERCLA).



Mr. Hull held a number of positions at Harding Lawson Associates (HLA), including Environmental Chemistry Group Leader, Analytical Laboratory Auditing/Contracts and Data Validation Manager, Project and/or Task Manager, Southeastern Region Regional Quality Assurance Officer, Florida Quality Assurance Officer, Project Quality Assurance Officer and corporate consultant on complex environmental contamination projects for all 22 offices. He participated in investigations at a number of CERCLA and RCRA facilities in both the government (US Air Force, Navy, Coast Guard, and Army) and private sectors. He has written Sampling and Analysis Plans (SAP), Quality Assurance Project Plans (QAPP), Health and Safety Project Plans (HASPP), and Work Plans (WP) for CERCLA and RCRA Investigations. He has also performed Environmental Assessments and participated in Environmental Impact Studies. Examples of some of the projects he has been involved with and the functions he has performed include the following:

**Preliminary Site Assessments and Environmental Assessments** - Responsible for the collection and evaluation of preliminary information (PSA'S) and the design and/or evaluation of soil and water monitoring programs to identify the presence of various organic compounds (e.g., pesticides and hydrocarbons) and hazardous metals. Compilations were used for the purpose of developing EA's and determining the need or type of further action. Client: Numerous commercial and industrial clients in Alaska, California, Texas, and Louisiana.

**EA Project Manager** - Responsible for investigation and preparation of two environmental assessments concerning the proposed production of radiopharmaceuticals. These involved the environmental assessment of source target preparation, source irradiation, radioactive decay, and transport, storage and disposal of source material, products, and radioactive waste byproducts. Client: Los Alamos National Laboratory

**PSA Principal Investigator** - Responsible for the preliminary site assessment at DoD High Explosive Test Facility. The investigation included the identification of explosive compounds and degradation products, their distribution, potential risks, and remediation alternatives. Client: Kirtland Air Force Base

**Southeastern Region, Regional Quality Assurance Officer** - Responsible for all quality assurance activities in seven southeastern states. Wrote and implemented HLA's Florida Comprehensive Quality Assurance Plan, required to perform environmental/hazardous waste work in Florida. Coauthored HLA's Field Sampling Manual.

**Hunters Point Naval Annex, San Francisco, CA** - Project geochemical consultant on sampling strategy, and analytical testing for site characterization, risk assessment, and background studies. Provided quality assurance support for field investigation activities, health and safety compliance, and analytical laboratory auditing and data validation, (CERCLA). Client: U.S. Navy, WESTDIV

**Fort Ord Army Installation, Monterey, CA** - Project consultant on sampling strategy (QAPP and SAP development), analytical chemistry program, and data validation. Provided quality assurance support for field activities and health and safety compliance, (CERCLA). Client: U.S. Army Corps of Engineers, Sacramento Division

**Lowry Landfill, Denver, CO** - Contaminant transport task manager for the site Risk Assessment and Remedial Investigation activities at an industrial mixed-waste landfill. Included modeling of organic biodegradation and serial radioactive decay. Client: Lowry Landfill Coalition

**RI/FS Studies** - Responsible for technical oversight of several remedial investigation and feasibility studies on behalf of PRP's. Studies include design of chemical sampling programs to identify the lateral and vertical extent of plumes, statistical analysis to assess efficiency of remedial measures, and geochemical interpretation of results. Responsibilities include presentation of findings for clients, and





**State and Federal agencies.** Client: Several San Francisco Bay Area Industrial, Commercial, and Financial firms.

**Pesticide and PCB Contamination Studies** - Responsible for the design and data interpretation for several pesticide contamination studies for which Environmental Assessments were performed. Study sites included both agricultural and industrial settings. One study involved the development of a complex QC program to validate the identification and quantitation of pesticides for litigative purposes. Client: Several landowners and real estate developers.

**Tundra Environmental Chemistry Study** - Responsible for the evaluation of organic and inorganic chemical data from soil, water, and vegetation at a North Slope, Alaska, well field. Developed a geochemical/statistical model of the migration and impact of reserve pit drilling fluids on the tundra environment. Client: Major U.S. oil company.

**Oil Well Reserve Pit Seepage Study** - Responsible for the geochemical evaluation of organic and inorganic chemical data from waters, soils, and drilling materials at a North Slope, Alaska, well field. Modeled the inorganic geochemical transport through gravel berms and pads. Client: Major U.S. oil company.

**Power Plant Environmental Impact Investigation** - Responsible for the monitoring design, and the collection, quality control, and interpretation of organic and inorganic chemical data. Evaluated the chemical impacts to soil and ground water from the introduction of boiler steam blowdown, and demineralizer system discharges into the subsurface, Kenai, Alaska. Client: Chugach Electric Association, Anchorage, Alaska.

**Landfill Site Assessment** - Responsible for the monitoring design, and the collection, quality control, and interpretation of organic and inorganic chemical data from soil and water samples. Evaluated the impact of potentially migrating contaminants from a domestic landfill on adjacent land use for the Aleutian Air Facility, Cold Bay, Alaska. Client: U.S. Coast Guard.

**Petroleum Tank Field Site Assessments** - Responsible for the monitoring design and interpretation of organic chemical data at tank farm facilities. Performed a statistical evaluation of soil organic chemical data to evaluate sources and distributions of organics from leaking tanks, pipelines, and transfer facilities. Client: Major U.S. Oil company.

**CERCLA Investigation, Mountain View, California** - Project consultant on the geochemical and statistical evaluation of organic and inorganic chemical data for the Remedial Investigation and Feasibility Study. Performed a similar task for the lawyers representing one PRP (Raytheon). Client: Raytheon Company, Intel Corporation, and Fairchild Semiconductor Corporation, Mountain View, California.

**Gold Mine Waste Characterization Study** - Responsible for the sampling design, inorganic chemical analysis, and quality control program for soil samples from mine tailings, Nome, Alaska. Assessed the horizontal and vertical distribution of arsenic and mercury in mine tailings and native soils and the potential for airborne transport at a recreational field. Client: Alaska Gold Company, Nome, Alaska.

**Solid Waste Assessment Test (SWAT) Studies** - Project geochemist on several SWAT studies at San Francisco Bay Area RCRA disposal sites. Responsible for the design of chemical sampling programs to address regulatory requirements for the characterization and migration of hazardous organic and inorganic chemical constituents in air, water, and soil. Client: Several San Francisco Bay Area landfill and disposal companies.



**Storm Sewer Corrosion Studies** - Responsible for the design and evaluation of soil and water sampling studies to find the cause and the solution to advanced-stage corrosion of galvanized steel storm sewers. Used both geochemical and corrosion engineering approaches to the evaluation of subsurface conditions and the recommendation for future actions. Client: Municipality of Anchorage, Alaska.

**Geothermal Resource Assessment** - Responsible for the development of geochemical sampling programs to evaluate the extent and characteristics of potential geothermal sources in Lassen and Plumas counties, California. Evaluated the resource by using various geochemical techniques including equilibrium modeling, geothermometry, and stable isotope analysis to examine mixing of waters and calculate in situ temperatures. Client: Confidential.

**Low-Level Radioactive Waste Site Characterization Study** - Responsible for the design and implementation of an investigation to characterize the geochemical environment of both vadose and saturated zones at potential disposal sites in arid areas in the western U.S. The study includes an examination of a large suite of organic and inorganic chemicals, stable and radioactive isotopes, and age dating of waters. Requirements stipulate that the study fulfill NRC and DOE regulatory constraints although primacy is with the State. Client: Confidential.

**Oil-field Waters Characterization Studies** - Responsible for the geochemical interpretation and modeling of waters collected from several Gulf Coast oil-fields. Results were used for studies of re-injection and/or migration potential. Client: U.S. Geological Survey (internal)

**Geochemical Modeling** - Redesigned PL/1 computer code SOLMNEQ and formulated new version in Fortran 77. Developed subroutines to determine aqueous speciation including several organic compounds in dilute to high ionic strength fluids at temperatures up to 350 degrees Celsius. Client: U.S. Geological Survey (internal)

Projects conducted on behalf of the U.S. Air Force Reserves:

**Pollution Inventory and Quality of Water (QW) Monitoring, Travis AFB, California** - Developed surface water pollution inventory and QW monitoring program to alert facility managers of biological or chemical contaminant migration on Travis AFB or to detect accidental discharge to adjoining private lands. Client: U.S. Air Force (internal)

**Installation Restoration Program, Travis Air Force Base, California** - Served as on-site technical consultant and primary technical reviewer for Air Force during each stage of the Travis AFB Installation Restoration Program development. Client: U.S. Air Force (internal)

**Hydrocarbon Containment Program, Travis Air Force Base, California** - Wrote technical summaries and served as technical consultant to Travis AFB Civil Engineer concerning hydrocarbon spill project. Client: U.S. Air Force (internal)

As a hydrologist with the U. S. Geological Survey (USGS), Water Resources Division (WRD), Mr. Hull worked both in the Western Region Research Office (Menlo Park, CA) and in District operations (Florida and New Mexico). He served as a Project Leader, Team Member, and Water Quality Specialist and worked in laboratory research and field investigations. Examples of some of the projects he has been involved with and the functions he has performed include the following:

**Grants Mineral Belt, northwestern New Mexico** - Developed guidelines for site investigations to assess and monitor potential contamination of ground water by uranium mining activities on federal and Indian lands. Client: U.S. Bureau of Mines



**Nationwide Radiochemical Surveillance** - Statistically evaluated U.S. Geological Survey National Radiochemical Surveillance Network data to identify significant trends in selected radiochemical parameters and recommend modifications to meet national program objectives. Client: U.S. Geological Survey (Internal)

**Waste Isolation Pilot Plant (WIPP), New Mexico** - Served as geochemical consultant and technical reviewer of documents relating to the site characterization of the WIPP site for storage of low level nuclear waste. Client: U.S. Bureau of Land Management

**Hazardous Waste Injection Study, Pensacola, Florida** - Served as project manager and staff geochemist responsible for monitoring and modeling migration of untreated acidic organic waste introduced through deep-well injection into limestone aquifer. Client: Monsanto Chemical Company

**Hazardous Waste Investigation Study, Pensacola, Florida** - Served as project manager and staff geochemist on hazardous waste investigation to monitor and model migration of treated organic waste introduced through deep-well injection into limestone aquifer. Client: American Cyanamid Company

**Urban Runoff Study, Live Oak, Florida** - Served as project manager and staff geochemist on study to investigate temporal and spatial variations in chemistry of urban runoff to recharge wells supplying potable zones of Floridan Aquifer. Client: State of Florida

**Phosphate Mining Environmental Impact Study, Osceola and Suwannee Counties, Florida** - Developed mining scenario and performed geohydrologic study to evaluate and predict potential geochemical environmental impacts to protected wild and scenic river and Florida's major freshwater aquifer. Client: U.S. Dept. of Interior (by order of U.S. Supreme Court)

**Water Resources Investigation, Springs of Florida** - Studied the hydrology and geochemistry of Florida springs emanating from various aquifers for resource evaluation. Client: Florida State Geological Survey

#### **Professional Societies and Honors**

American Chemical Society  
Geochemical Society  
International Association of Geochemists and Cosmochemists  
International Oceanographic Foundation  
Sigma Xi

1986 U.S. Geological Survey Special Achievement Award

1977 Elected Associate Member Sigma Xi

1973 Outstanding Geology Senior, Chevron Oil Co.

#### **Training**

40 Hour OSHA Health and Safety Training and Field Experience requisites for qualification to Engage In Hazardous Materials Operations IAW 29 CFR Part 1910.120 (12/1,2,3,8,9/87)

8 Hour OSHA Supervisory Hazardous Materials/Waste Health and Safety Training IAW 29 CFR 1910.120 (12/10/87)

8 Hour OSHA Hazardous Substances/Waste Annual Health and Safety Refresher training IAW 29 CFR 1910.120 (9/11/91)

Confined Space California OSHA Training IAW Title 8 CCR, Section 5157 (1/29/92).



Robert W. Huff (continued)

Attended numerous one and two-week courses in hydrology, inorganic and organic geochemistry, flow and solute transport modeling, statistical applications, leadership, project management, technical writing, and hazardous materials workshop (U.S. Geological Survey and Independent courses).

Environmental Regulation Course, Executive Enterprises Inc. and Holme Roberts & Owen (Denver, CO), (3/7-9/90).

NPDES Permit Regulations for Municipal and Industrial Storm Water Discharges, Workshop (US EPA, California State Water Resources Control Board, California Regional Water Quality Control Boards) (2/28/91).

American Society of Civil Engineers, Self-Study Course: "The Engineer as an Expert Witness", ASCE Continuing Education Services (2/90).

California Environmental Technical Workshop, sponsored by the U.S. Air Force Regional Environmental Management Office (REO), and McClellan Air Force Base, Directorate of Environmental Management (2/25-26/91)

Department of Defense, Nuclear, Biological, and Chemical Warfare (NBC), Disaster Preparedness, and Medical Warfare Defense Training (MWDt), annually.

Medical Effects of Nuclear Weapons, Armed Forces Radiobiology Institute, Defense Nuclear Agency, Bethesda, Maryland (5/27- 28/92)

#### Publications

1991. "Factors Affecting the Dermal Bioavailability of Hydrocarbons in Soil: Applicability to Human Health Risk Assessment". Chapter 37 In Hydrocarbon Contaminated Soils, Volume I, eds. Calabrese, E. I., and Kosteck, P. T., Lewis Publishers, p. 541-554. (with G. E. Watkin).

1988. Program SOLMINEQ.88; SOLution-MINeral Equilibrium, In SOLMINEQ.88: A computer program for geochemical modeling of water-rock interactions, U.S. Geological Survey Water Resources Investigation Report 88-4227, p. 209-420 (with Aggarwal, P. K., DeBraal, J. D., Gunter, W. D., Kharaka, Y. K., Perkins, E. H., and Specht, D. J.).

1986. SOLMNEQF: A computer code for geochemical modeling of water-rock interactions in sedimentary basins. Proceedings, Third Annual Canadian-American Conference on Hydrology; Hydrology of Sedimentary Basins: Applications to Exploration and Exploitation; ARC, N.W.W.A., Banff, Canada (with P. K. Aggarwal, Y. K. Kharaka, and W. D. Gunter).

1985. Chemical composition of formation waters from northern Gulf of Mexico basin: Implication for mineral diagenesis. Proceedings, Research Conference on Timing of Siliclastic Diagenesis, Gulf SEPM, Austin, Texas (with Y. K. Kharaka and L. M. Law).

1985. Water-rock interactions in sedimentary basins. Chapter 2, Relationship of Organic Matter and Mineral Diagenesis. SEPM Short Course No. 17 (with Y. K. Kharaka and W. W. Carothers).

1984. Sampling and analysis of subsurface waters: a summary of current methodology. Proceedings, Canadian-American Conference on Practical Applications of Groundwater Geochemistry, ARC, N.W.W.A., Banff, Canada (with Y. K. Kharaka, A. S. Maest, and T. L. Fries).

1982. An overview of some geochemical aspects of subsurface storage of liquid waste in northwest Florida. In Ground Water in Florida, Proceedings of the First Annual Symposium on Florida Hydrology, Northwest Florida Water Management District, Public Information Bulletin, 82-2.





1982. Data on subsurface storage of liquid waste near Pensacola, Florida; 1963-1980. U.S. Geological Survey Open-file Report 82-689 (with J.B. Martin).

1981. Uranium Isotopic Disequilibrium: Its hydrologic application to Floridan Aquifer waters of northeast Florida, Florida State University, (unpublished Masters Thesis).

1980. Quality of surface water in the Suwannee River basin, Florida, August 1968 through December 1977. U.S. Geological Survey Water-Resources Investigation 80-110 (with J. E. Dysart and W. B. Mann IV).

1979. Chemical, physical, and radiological quality of selected water supplies in Florida, November 1977-February 1978. U.S. Geological Survey Water-Resources Investigation 79-50 (with G. A. Irwin).

1979. Quality of storm runoff to drainage wells in Live Oak, Florida, April 4, 1979. U.S. Geological Survey Open-file Report 78-1073 (with M. C. Yurewicz).

1979. Quality of untreated water for public supplies in Florida with reference to the national primary drinking water regulations. Florida Dept. of Natural Resources, Bureau of Geology Map Series 91 (with G. A. Irwin).

1979. Water-Resources data Index for Osceola National Forest, Florida. U.S. Geological Survey Open-file Report 79-984 (with P. R. Seaber).

1978. Impact of potential phosphate mining on the hydrology of Osceola National Forest, Florida. U.S. Geological Survey Water-Resources Investigation 78-6 (with J. A. Miller, G. H. Hughes, and J. Vecchioli).

1977. Springs of Florida. Department of Natural Resources, Bureau of Geology, Bulletin 31 (Revised). (with J. C. Rosenau, G. L. Faulkner, and C. W. Hendry).



## CURRICULUM VITAE

Fanny K. Ennever, Ph.D.

Date of Birth: April 14, 1955  
Place of Birth: Chapel Hill, North Carolina  
Marital Status: Married to John F. Ennever Ph.D., M.D.  
Children: Paul Chappell Ennever 9/21/87  
Joseph Knox Ennever 11/14/89

Work address: Department of Public Health Sciences  
The Bowman Gray School of Medicine  
Medical Center Boulevard  
Winston-Salem, North Carolina 27157-1063  
(919) 748-6498

Home address: 193 Heathcliff Place  
Winston-Salem, North Carolina 27104  
(919) 765-8422

### EDUCATION

- 1980-85: Center for Earth and Planetary Physics, Division of Applied Sciences, Harvard University, Cambridge, Massachusetts. A.M., 1981; Ph.D. in Applied Physics, 1985.
- 1977-78: Interdisciplinary Science Department, Massachusetts Institute of Technology, Cambridge, Massachusetts. M.S. in Environmental Chemistry, 1978.
- 1976-77: Chemistry Department, Massachusetts Institute of Technology, Cambridge, Massachusetts. National Science Foundation Graduate Fellow.
- 1973-76: Harvard-Radcliffe College, Cambridge, Massachusetts. A.B. in Chemistry, *Summa cum laude*, Phi Beta Kappa, 1976.

### EMPLOYMENT

- 1991-Present: Assistant Professor, Department of Public Health Sciences and Department of Physiology and Pharmacology, The Bowman Gray School of Medicine, Wake Forest University, Winston-Salem, North Carolina.  
Primary activities include research and teaching in the areas of risk assessment, toxicology, food safety, and environmental epidemiology.



EMPLOYMENT (continued)

1989-91: Principal Scientist, ICAIR, Life Systems, Inc., Cleveland, Ohio.

Tasks as a government contractor at Life Systems, Inc. included authoring Toxicological Profiles on cadmium, dibenzofuran, di-n-butyl phthalate, methyl mercaptan and thallium for the Agency for Toxic Substances and Disease Registry; Criteria Documents for radium and radon for the U.S. Environmental Protection Agency's Office of Drinking Water; and Risk Assessments for two hazardous waste sites for the U.S. Environmental Protection Agency.

1985-89: Assistant Professor (1988-89), Instructor (1986-88), NIH Post-doctoral Trainee (1985-86), Department of Environmental Health Sciences, Case Western Reserve University School of Medicine, Cleveland, Ohio.

Performed independent research in risk assessment, including development and application of a methodology for relating genotoxicity to carcinogenic potential, formulation of cost-effective strategies for identifying carcinogens, and detailed quantitative assessment of the risks from indoor radon.

1985 (Jan-Mar): Post-doctoral fellow, Center for Earth and Planetary Physics, Division of Applied Sciences, Harvard University, Cambridge, Massachusetts.

Continued thesis research on modeling physical, chemical, and biological factors controlling the atmospheric concentration of carbon dioxide.

1978-80: Environmental Scientist, Permits Division, Office of Enforcement, U.S. Environmental Protection Agency, Washington, DC. GS-9, GS-11 level. Meritorious service award, 1980.

Developed and modified regulations for control of priority pollutants under the National Pollutant Discharge Elimination System. Provided primary technical input for chemical monitoring requirements. Assisted in coordinating with offices regulating solid waste, underground injection, and wetlands to develop the consolidated permit system.

TEACHING EXPERIENCE

1989: Instructor, Fundamentals of Environmental Health Sciences: Risk Assessment, new core course in departmental curriculum, Case Western Reserve University.

1988: Instructor, Independent Study in Environmental Health Sciences: Risk Assessment, student from Weatherhead School of Management, Case Western Reserve University.

1987, 88: Small group leader, Case Oriented Problem Solving, medical school core curriculum, Case Western Reserve University.

1986, 87: Co-instructor, Chemical Carcinogenesis and Mutagenesis, graduate course, Case Western Reserve University.



TEACHING EXPERIENCE (continued)

- 1986: Sponsor, senior project student from Ursuline College; summer internship student from Princeton University.
- 1983, 84: Teaching assistant, Atmospheric Physics and Chemistry, undergraduate course, Harvard University.
- 1977: Teaching assistant, Physical Organic Chemistry, graduate course, Massachusetts Institute of Technology.

ORIGINAL PUBLICATIONS

- Knox F. *The Behavior of Ferrochrome Lignosulfonate in Natural Waters*. Masters Thesis, Massachusetts Institute of Technology, 1978.
- Knox F and McElroy MB. Changes in atmospheric CO<sub>2</sub>: Influence of the marine biota at high latitude. *J. Geophys. Res.* 89:4629-4637, 1984.
- Ennever FK and McElroy MB. Changes in atmospheric CO<sub>2</sub>: Factors regulating the glacial to interglacial transition. In ET Sundquist and WS Broecker (Eds), *The Carbon Cycle and Atmospheric CO<sub>2</sub>: Natural Variations Archean to Present*, American Geophysical Union, Washington DC, pp. 154-162, 1985.
- Ennever FK. *The Influence of Oceanic Chemistry, Physics, and Biology on Atmospheric Carbon Dioxide*. Ph.D. Thesis, Harvard University, 1985.
- Ennever FK and Rosenkranz HS. Predicting the carcinogenicity of the aromatic amine derivatives tested in the second UKEMS collaborative study. *Mutagenesis* 1:119-123, 1986.
- Ennever FK and Rosenkranz HS. Evaluating batteries of short-term genotoxicity tests. *Mutagenesis* 1:293-298, 1986.
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**WORK PLAN  
FOR THE  
REMEDIAL INVESTIGATION/FEASIBILITY STUDY  
OVERSIGHT  
AT THE  
WEST LAKE LANDFILL SUPERFUND SITE  
BRIDGETON, MISSOURI**

**VOLUME II**

**EPA Contract No. 68-W9-0032  
Work Assignment No. 23-7P14**

**May 27, 1993**

**SVERDRUP CORPORATION  
ST. LOUIS, MISSOURI**



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## **1.0 INTRODUCTION**

This volume of the Work Plan represents information regarding those items related to contract requirements. Deliverables are described in Section 2.0, any exceptions, anticipated problems, and special requirements are presented in Section 3.0, subcontracting is discussed in Section 4.0, results of the conflict of interest search by Sverdrup and Team members are presented in Section 5.0, and project cost estimates are presented in Section 6.0.



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## 2.0 DELIVERABLES

The deliverables to be prepared and submitted for each work assignment task are discussed in the following subsections. The estimated Professional Level of Effort (PLOE) for the performance of each task by Sverdrup and Team Members, Los Alamos Technical Associates (LATA) and Life Systems, Inc. (LSI), is also included. All deliverables will be provided to EPA in both a hard copy form and on computer diskette(s) formatted in the WordPerfect version 5.1 word processing software.

### 2.1 Task 1 - Work Plan Preparation

This task includes the development of and any revisions to the project Work Plan which outlines the planned activities as presented in the Statement of Work (SOW, Work Plan Volume I, Appendix I), during the scoping/introduction meeting, and subsequent phone calls with the RPM.

<u>Sverdrup</u>		<u>LATA</u>		<u>LSI</u>	
P4	8	P4	5	P4	2
P3	0	P3	15	P3	8
P2	0	P2	0	P2	0
P1	56	P1	0	P1	2
T2	1	T2	0	T2	0
T1	<u>4</u>	T1	<u>0</u>	T1	<u>0</u>
Clerical 2		Clerical 10		Clerical 3	
Total	69	Total	20	Total	12
TOTAL TASK 1 PLOE					101



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## 2.2 Task 2 - Project Monitoring and Control

This task incorporates control of project progress, schedule, and budget. Deliverables include monthly reports which will encompass tracking of the project on a task specific basis and performance evaluations. Internal contractual responsibilities will be included under this task, such as initiation of Task Authorizations to Team members, preparation of bid packages (if required), and purchasing of equipment and supplies that may be required for field activities.

The Sverdrup Project Manager will utilize an estimated 4 hours per month for activities under this task and senior level management activities have been estimated at 1 hour per month. LATA is estimating six hours per month for project management activities.

<u>Sverdrup</u>		<u>LATA</u>		<u>LSI</u>	
P4	17	P4	17	P4	0
P3	0	P3	69	P3	3
P2	0	P2	0	P2	0
P1	68	P1	0	P1	2
T2	24	T2	0	T2	0
T1	<u>8</u>	T1	<u>0</u>	T1	<u>0</u>
Clerical 8		Clerical 20		Clerical 6	
Total	117	Total	86	Total	5
<b>TOTAL TASK 2 PLOE</b>					<b>208</b>



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### 2.3 Task 3 - File Review for Site Familiarization

Activities to be conducted under this task are associated with the review of previous site investigation reports. The documents to be reviewed will be provided by EPA and EPA's negotiation support contractor may be available for assistance to ensure that the most important documents are reviewed. No deliverables are to be prepared under Task 3.

Sverdrup will perform a cursory review of file reports to become familiar with them as an aid to reviewing comments provided by LATA. The major effort for this task will be provided by LATA. **LATA will require approximately 120 hours to review existing files.**

<u>Sverdrup</u>		<u>LATA</u>		<u>LSI</u>	
P4	0	P4	40	P4	0
P3	2	P3	40	P3	0
P2	0	P2	0	P2	0
P1	4	P1	0	P1	0
T2	0	T2	0	T2	0
T1	<u>0</u>	T1	<u>0</u>	T1	<u>0</u>
Clerical 0		Clerical 0		Clerical 0	
Total	6	Total	80	Total	0

**TOTAL TASK 3 PLOE      ~~86~~**





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#### 2.4 Task 4 - Site File Summary Report

The Site File Summary Report will be prepared upon completion of the review included under Task 3. This deliverable will focus on identifying any gaps in past investigations regarding areas not previously addressed and will also provide information regarding site contaminants of concern. The major effort on this task will be provided by LATA. Sverdrup will review LATA's comments and incorporate them into a report form to submit to EPA.

<u>Sverdrup</u>		<u>LATA</u>		<u>LSI</u>	
P4	1	P4	36	P4	0
P3	2	P3	36	P3	0
P2	0	P2	0	P2	0
P1	2	P1	0	P1	0
T2	1	T2	0	T2	0
T1	<u>0</u>	T1	<u>0</u>	T1	<u>0</u>
Clerical	0.5	Clerical	20	Clerical	0
Total	6	Total	72	Total	0

**TOTAL TASK 4 PLOE 78**

#### 2.5 Task 5 - Attend Meetings and Conference Calls

Technical meetings and conference calls will be an important aspect in this work assignment. Timely communications between EPA and Sverdrup Team members will be required to ensure that all RI/FS activities are being performed appropriately. Deliverables under this task include Telecon Memos which summarize the discussed items. For more lengthy meetings, proceedings will be submitted to the EPA RPM following the submission of the Telecon Memo.

For purposes of providing EPA with an estimate of hours for this task, the following assumptions are taken into consideration:

- For Sverdrup, two meetings are planned, one of which is the scoping meeting/site visit and another is a meeting at a later stage during the project. It is assumed that two individuals from Sverdrup will attend, that one hour is required for preparation, the



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duration of the meeting is four hours (eight for the scoping meeting), and two hours are required for one individual to write up meeting notes.

- For LATA, six meetings are estimated to be held in St. Louis. For four of these meetings, one individual will attend and for two meetings, two individual will attend. Since LATA personnel must travel, it is assumed that up to 16 hours may be utilized per trip. This includes six hours of travel, four hours for the meeting, and the remaining hours will be utilized in preparation and follow-up meeting notes.

<u>Sverdrup</u>		<u>LATA</u>		<u>LSI</u>	
P4	12	P4	30	P4	0
P3	0	P3	96	P3	0
P2	0	P2	0	P2	0
P1	18	P1	0	P1	0
T2	0	T2	0	T2	0
T1	<u>0</u>	T1	<u>0</u>	T1	<u>0</u>
Clerical	0	Clerical	20	Clerical	0
Total	30	Total	126	Total	0

**TOTAL TASK 5 PLOE 156**

## **2.6 Task 6 - RI/FS Documents Review**

This task will encompass the major effort of this work assignment. Fourteen of the PRPs contractor's documents are scheduled to be reviewed. The PLOE estimated below include hours for review of the document, discussion of findings with EPA and Team members, and the preparation of comments. The list of deliverables included under this task are review comments to be provided for each of the documents listed below.

- Final Work Plan
- Health and Safety Plan
- Draft Interim Investigation Results
- Final Remedial Investigation Report



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- Refined Remedial Action Objectives
- Development and Screening of Remedial Alternatives
- Comparison of Remedial Alternatives
- Draft Feasibility Study
- Final Feasibility Study

The major effort involving the technical review of these documents will be performed by LATA. Conference calls will be conducted as necessary between LATA and Sverdrup to ensure a concurrence on the review comments. Sverdrup will perform a cursory review of the documents, will review LATA's comments for technical accuracy and consistency with project approach and goals, and will provide EPA with the resulting Technical Memorandum.

<u>Sverdrup</u>		<u>LATA</u>		<u>LSI</u>	
P4	8	P4	280	P4	4
P3	56	P3	430	P3	16
P2	0	P2	0	P2	0
P1	28	P1	0	P1	2
T2	0	T2	0	T2	0
T1	<u>0</u>	T1	<u>0</u>	T1	<u>0</u>
Clerical	8	Clerical	75	Clerical	6
Total	92	Total	710	Total	22

**TOTAL TASK 6 PLOE 824**

## 2.7 Task 7 - Field Oversight/Site Visits

Field oversight activities will be conducted at the request of the RPM. For cost estimating purposes, it is assumed that five site visits will take place. One trip of one day duration and two trips of three days duration for one person from both Sverdrup and LATA. It is assumed that one hour will be required for planning purposes before the field visit, eight hours will be the duration of field oversight per day, and two hours will be required for writing up notes on the field



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visit. Trips will be planned to observe soil sampling, groundwater well installation, groundwater sampling, decontamination procedures, and waste handling operations.

<u>Sverdrup</u>		<u>LATA</u>		<u>LSI</u>	
P4	0	P4	8	P4	0
P3	70	P3	64	P3	0
P2	0	P2	0	P2	0
P1	0	P1	0	P1	0
T2	0	T2	0	T2	0
T1	<u>0</u>	T1	<u>0</u>	T1	<u>0</u>
Clerical 1		Clerical 0		Clerical 0	
Total	70	Total	72	Total	0

**TOTAL TASK 7 PLOE 142**

## **2.8 Task 8 through 12 - Baseline Risk Assessment**

The Baseline Risk Assessment (BRA) and all necessary interim deliverables will be developed by the Missouri Department of Health (MDOH). Sverdrup is not anticipating any participation in the coordination effort to develop the BRA.





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### 2.9 Task 13 - Project Closeout

Closeout activities will begin when directed by the RPM. Tasks to be conducted for closeout of this project include reproduction of files, organization of files and records, and the packing of files and materials for return to EPA Region VII. It is assumed that microfiche is not a requirement for the closeout of this project.

<u>Sverdrup</u>		<u>LATA</u>		<u>LSI</u>	
P4	4	P4	25	P4	0
P3	0	P3	30	P3	2
P2	0	P2	0	P2	0
P1	16	P1	0	P1	1
T2	16	T2	0	T2	0
T1	<u>4</u>	T1	<u>0</u>	T1	<u>0</u>
Clerical 2		Clerical 25		Clerical 1	
Total	40	Total	55	Total	3
<b>TOTAL TASK 13 PLOE 98</b>					

### 2.10 Task 14 - Review of Baseline Risk Assessment

Sverdrup's Team member, Life Systems, Inc., will be primarily responsible for the technical review and quality control check of the BRA. Deliverables to be provided under this task include Technical Memorandums resulting from the review of the following which are to be developed by MDOH:

- Technical Memorandum regarding the adequacy of the data for utilization in the BRA.
- Technical Memorandum regarding the chemicals of potential concern.
- Evaluation of a comparison of potential site contaminants with background levels.
- Exposure Assessment, including: the conceptual site model, characterization of physical settings, identification of exposed populations and potential exposure pathways.



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- Toxicity Assessment, including: Evaluation of critical toxicity values, adverse health effects for each COC, and a QC check of the data retrievals.
- Draft Baseline Risk Assessment. A QA/QC check will be conducted on all the basic risk calculation equations. It assumed that all data entry and exposure point calculations will be done correctly and that all calculations will be performed using a computerized spread sheet.
- Final Baseline Risk Assessment.

<u>Sverdrup</u>		<u>LATA</u>		<u>LSI</u>	
P4	1	P4	24	P4	6
P3	0	P3	24	P3	40
P2	0	P2	0	P2	2
P1	8	P1	0	P1	2
T2	1	T2	0	T2	0
T1	<u>0</u>	T1	<u>0</u>	T1	<u>0</u>
Clerical 1		Clerical (30, ?		Clerical 16	
Total	10	Total	48	Total	50

**TOTAL TASK 14 PLOE 108**



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### **3.0 EXCEPTIONS, ANTICIPATED PROBLEMS, SPECIAL REQUIREMENTS**

Professional Level of Effort (PLOE) estimates regarding the review and comment on the RI/FS documents and the BRA were determined by anticipating that they will be of similar quality and volume which is typical of a professional environmental contractor deliverable. Adjustments may be required once the document has arrived in the Sverdrup office and the review process begins. Documents that are unclear or have unanticipated problems will require a more thorough review and commenting process. Any potential discrepancies between the number of hours originally estimated in this work plan and what may seem more appropriate after a cursory review of the document will be communicated immediately with the EPA RPM.

Every attempt will be made to provide EPA with the requested tasks and field oversight support to enable EPA to maintain the overall project schedule. Availability of Team member support and field oversight personnel can be more efficiently scheduled if Sverdrup can receive at least two weeks notice before the task begins. Sverdrup understands that some RI/FS activities may require immediate and/or timely attention and it is our goal to maintain constant communications in order to provide support to EPA on an as-needed basis.



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#### **4.0 SUBCONTRACTING**

Sverdrup expects to have adequate level of effort allocations to perform all the work assignment tasks with its own team members. Subcontracting will not be necessary for this project.





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## **5.0 Conflict of Interest**

Sverdrup has conducted an internal search to determine if any conflict of interest exists with any of the recognized Potentially Responsible Parties (PRPs). Sverdrup believes that no conflict of interest exists since, the best of our knowledge, no work has been performed at the West Lake Landfill Superfund Site and no current or historical (1980 to present) relationships exist with any of the PRPs listed by EPA.

In addition, Sverdrup's Team members, Los Alamos Technical Associates, Inc. and Life Systems, Inc. have conducted a search of their activities and do not now, nor have they historically (1980 to present) contracted work with any of the known PRPs for this site.



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## **6.0 PROJECT COST ESTIMATE**

The following cost estimate was prepared based on the assumptions presented in Sections 2.0 and 3.0. The cost estimate was prepared by using pricing information from Sverdrup's Best and Final Offer and current price information. Each task was estimated individually for manpower and direct costs. The following summary pricing sheets reflect the manpower, direct costs, and fees.

The total estimated Professional Level of Effort (PLOE) for completion of this work assignment is 1801 hours at a cost of \$191,080.29.



PROFESSIONAL GRADE BY PROJECT TASK  
WEST LAKE LANDFILL RIFS OVERSIGHT  
WORK ASSIGNMENT NO.: 23-7P14  
EPA CONTRACT NO.: 68-W9-0032

PROJECT TASK	LABOR HOURS								SVERDRUP LABOR COST	EXPENSES				INDIRECT TOTAL COST	TOTAL W/O FEE	FEE ON TEAM \$/HR		TOTAL *
	37.75 P4	26.34 P3	22.27 P2	18.99 P1	18.22 T2	13.59 T1	TOTAL P/T HRS	9.29 CL		OOC*	TRAVEL	LATA*	LSI*			FEE	FEE	
Task 1 - Work Plan																		
SVERDRUP Cost	302.00	0.00	0.00	1,057.84	18.22	54.36		18.56	1,451.00	148.00	0.00	1,990.00	1,137.00	2,772.28	7,466.28	437.13	121.71	8,057.12
Hours	8.0	0.0	0.0	56.0	1.0	4.0	69.0	2.0										
LATA Hours	5.0	15.0	0.0	0.0	0.0	0.0	20.0	10.0										
LSI Hours	2.0	8.0	0.0	2.0	0.0	0.0	12.0	3.0										
Task 2 - Project Monitor																		
SVERDRUP Cost	841.75	0.00	0.00	1,284.52	437.28	108.72		74.32	2,546.59	317.50	0.00	7,838.00	1,120.00	4,865.51	16,687.80	772.98	355.00	17,815.57
Hours	17.0	0.0	0.0	68.0	24.0	8.0	117.0	8.0										
LATA Hours	17.0	69.0	0.0	0.0	0.0	0.0	66.0	20.0										
LSI Hours	0.0	3.0	0.0	2.0	0.0	0.0	5.0	6.0										
Task 3 - File Review																		
SVERDRUP Cost	0.00	52.68	0.00	75.56	0.00	0.00		0.00	129.24	205.00	0.00	7,360.00	0.00	245.02	7,839.28	57.83	284.40	8,280.48
Hours	0.0	2.0	0.0	4.0	0.0	0.0	6.0	0.0										
LATA Hours	40.0	40.0	0.0	0.0	0.0	0.0	60.0	0.0										
LSI Hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0										
Task 4 - Site File Summ.																		
SVERDRUP Cost	37.75	52.68	0.00	37.78	18.22	0.00		4.85	151.08	235.00	0.00	7,157.00	0.00	288.64	7,831.72	67.47	285.28	8,185.47
Hours	1.0	2.0	0.0	2.0	1.0	0.0	6.0	0.5										
LATA Hours	36.0	36.0	0.0	0.0	0.0	0.0	72.0	20.0										
LSI Hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0										
Task 5 - Meetings/Conf.																		
SVERDRUP Cost	433.00	0.00	0.00	340.02	0.00	0.00		0.00	793.02	153.00	9.10	26,102.00	0.00	1,515.14	28,572.26	247.03	1,044.08	29,863.37
Hours	12.0	0.0	0.0	18.0	0.0	0.0	30.0	0.0										
LATA Hours	30.0	96.0	0.0	0.0	0.0	0.0	126.0	20.0										
LSI Hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0										
Task 6 - RIFS Doc Rev																		
SVERDRUP Cost	302.00	1,475.04	0.00	528.92	0.00	0.00		74.32	2,380.28	1,297.50	0.00	66,272.00	1,576.00	4,547.76	76,075.54	822.55	2,709.32	79,607.42
Hours	8.0	56.0	0.0	28.0	0.0	0.0	92.0	8.0										
LATA Hours	280.0	430.0	0.0	0.0	0.0	0.0	710.0	75.0										
LSI Hours	4.0	16.0	0.0	2.0	0.0	0.0	22.0	6.0										
Task 7 - Field Oversight																		
SVERDRUP Cost	0.00	1,843.80	0.00	0.00	0.00	0.00		0.00	1,843.80	131.50	109.20	10,166.00	0.00	3,522.76	15,775.26	560.73	406.72	16,742.71
Hours	0.0	70.0	0.0	0.0	0.0	0.0	70.0	0.0										
LATA Hours	8.0	64.0	0.0	0.0	0.0	0.0	72.0	0.0										
LSI Hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0										
Task 8 - Rev Data BRA																		
SVERDRUP Cost	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0										
LATA Hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0										
LSI Hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0										
Task 9 - Exposure Assess																		
SVERDRUP Cost	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0										
LATA Hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0										
LSI Hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0										
Task 10- Toxicity Assess																		
SVERDRUP Cost	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0										
LATA Hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0										
LSI Hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0										



PROFESSIONAL GRADE BY PROJECT TASK  
 WEST LAKE LANDFILL R/F/S OVERSIGHT  
 WORK ASSIGNMENT NO.: 23-7P14  
 EPA CONTRACT NO.: 68-W9-0032

PROJECT TASK	LABOR HOURS								SVDRUP LABOR COST	EXPENSES				INDIRECT TOTAL COST	TOTAL W/O FEE	FEE ON TEAM SUBS		TOTAL *
	37.75 P4	26.34 P3	22.27 P2	18.89 P1	18.22 T2	13.59 T1	TOTAL P/T HRS	9.29 CL		ODC'S	TRAVEL	LATA*	LSI*					
<i>Task 11- Risk Character</i>																		
SVDRUP Cost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0									
LATA Hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0									
LSI Hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0									
<i>Task 12- BRA Report</i>																		
SVDRUP Cost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0									
LATA Hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0									
LSI Hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0									
<i>Task 13- Project Closeout</i>																		
SVDRUP Cost	151.00	0.00	0.00	302.24	291.52	54.36		18.58	817.70	419.00	0.00	5,668.00	294.00	1,562.30	8,781.00	279.90	237.61	9,278.51
Hours	4.0	0.0	0.0	16.0	16.0	4.0	40.0	2.0										
LATA Hours	25.0	30.0	0.0	0.0	0.0	0.0	55.0	25.0										
LSI Hours	0.0	2.0	0.0	1.0	0.0	0.0	3.0	1.0										
<i>Task 14- Review BRA</i>																		
SVDRUP Cost	37.75	0.00	0.00	151.12	18.22	0.00		9.29	216.36	113.00	0.00	5,216.00	6,746.00	413.42	12,705.80	74.28	496.57	13,239.64
Hours	1.0	0.0	0.0	8.0	1.0	0.0	10.0	1.0										
LATA Hours	24.0	24.0	0.0	0.0	0.0	0.0	48.0	30.0										
LSI Hours	6.0	40.0	2.0	2.0	0.0	0.0	50.0	16.0										
<b>TOTALS</b>																		
SVdrup Cost	1,825.25	3,424.20	0.00	3,778.00	783.48	217.44		199.74	10,328.09	3,019.80	118.30	137,771.00	10,877.00	19,732.84	181,848.72	3,319.87	5,913.89	191,080.29
SVdrup Hours	81.00	130.00	0.00	200.00	43.00	18.00	440.00	21.00										
LATA Hours	485.00	804.00	0.00	0.00	0.00	0.00	1289.00	200.00										
LSI Hours	12.00	89.00	2.00	9.00	0.00	0.00	82.00	32.00										

\* Costs shown in this column are inclusive (i.e. labor, direct, travel, etc.)

8:\SV\EL\OTUS\ADMIN\PRODRIGUE\23-HRS-2.WK3

Note: Risk Assessment activities for Tasks 8 - 12 are to be performed by the Missouri Department of Health. Review of the Risk Assessment is included under Task 14.





May 27, 1993

OTHER DIRECT COSTS  
PROJECT NO.: 23-7P14  
CONTRACT NO.: 68-W9-0032

ITEM	UNIT COST	TASK 1		TASK 2		TASK 3		TASK 4		TASK 5		TASK 6		TASK 7		TASK 8		TASK 9	
		QTY	COST	QTY	COST	QTY	COST	QTY	COST	QTY	COST	QTY	COST	QTY	COST	QTY	COST	QTY	COST
COMPUTER	\$10.00 PER HOUR		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
CADD	\$24.00 PER HOUR		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
MAIL/COURIER	\$11.50 PER 2 LB PKG	6	69.00	4	46.00	4	46.00	4	46.00	0	0.00	15	172.50	0	0.00		0.00		0.00
REPRODUCTION	\$0.15 PER PAGE	200	30.00	200	30.00	1,000	150.00	100	15.00	0	0.00	4,000	600.00	0	0.00		0.00		0.00
MISCELLANEOUS	(LUMP SUM)		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
SUPPLIES	(LUMP SUM)		40.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
EQUIPMENT (field) (PPE)	(LUMP SUM)		0.00		0.00		0.00		0.00		0.00		0.00		100.00		0.00		0.00
TELEPHONE	\$0.15 PER MINUTE	60	9.00	510	76.50	60	9.00	60	9.00	1,020	153.00	420	63.00	210	31.50		0.00		0.00
WORD PROCESSING	\$3.30 PER PAGE		0.00	50	165.00		0.00	50	165.00		0.00	140	462.00	0	0.00		0.00		0.00
TOTALS			148.00		317.50		205.00		235.00		153.00		1,297.50		131.50		0.00		0.00



May 27, 1993

ITEM	UNIT COST	TASK 10		TASK 11		TASK 12		TASK 13		TASK 14		TOTALS	
		QTY	COST	QTY	COST	QTY	COST	QTY	COST	QTY	COST	QTY	COST
COMPUTER	\$10.00 PER HOUR		0.00		0.00		0.00		0.00		0.00	0	0.00
CADD	\$24.00 PER HOUR		0.00		0.00		0.00		0.00		0.00	0	0.00
MAIL/COURIER	\$11.50 PER 2 LB PKG		0.00		0.00		0.00	20	230.00	2	23.00	36	832.80
REPRODUCTION	\$0.15 PER PAGE		0.00		0.00		0.00	100	15.00	100	15.00	5,800	855.00
MISCELLANEOUS	(LUMP SUM)		0.00		0.00		0.00		0.00		0.00	0	0.00
SUPPLIES	(LUMP SUM)		0.00		0.00		0.00		0.00		0.00	0	40.00
EQUIPMENT (field) (PPE)	(LUMP SUM)		0.00		0.00		0.00		0.00		0.00	0	100.00
TELEPHONE	\$0.15 PER MINUTE		0.00		0.00		0.00	60	9.00	60	9.00	2,400	360.00
WORD PROCESSING	\$3.30 PER PAGE		0.00		0.00		0.00	50	165.00	20	66.00	260	1,023.00
TOTALS			0.00		0.00		0.00		419.00		113.00		3,019.50



May 27, 1993

TRAVEL  
PROJECT NO.: 23-7P14  
CONTRACT NO.: 68-W9-0032

ITEM	UNIT COST	TASK 1		TASK 2		TASK 3		TASK 4		TASK 5		TASK 6		TASK 7		TASK 8		TASK 9	
		QTY	COST	QTY	COST	QTY	COST	QTY	COST	QTY	COST	QTY	COST	QTY	COST	QTY	COST	QTY	COST
CIR	PER TRIP PER TRIP		0.00 0.00		0.00 0.00		0.00 0.00		0.00 0.00		0.00 0.00		0.00 0.00		0.00 0.00		0.00 0.00		0.00 0.00
MILEAGE	\$0.26 PER MILE		0.00		0.00		0.00		0.00	35	9.10		0.00	70	18.20		0.00		0.00
CR RENTCL	\$25.00 PER DCY		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
HOTEL	\$60.00 PER DCY		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
PER DIEM	\$26.00 PER DCY (24 hrs)		0.00		0.00		0.00		0.00		0.00		0.00	4	91.00		0.00		0.00
MIS			0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
TOTALS			0.00		0.00		0.00		0.00		9.10		0.00		109.20		0.00		0.00



May 27, 1993

[illegible]





## **APPENDIX**

### **WORK ASSIGNMENT FORM**



## USEPA

## WORK ASSIGNMENT FORM

## 1. WORK ASSIGNMENT INFORMATION

PROJECT NAME: West Lake Landfill CONTRACTOR: Sverdrup WORK ASSIGNMENT NO.: 23-7P14  
 ACTIVITY: RI/FS OS EPA CONTRACT NO.: 68-W9-0032 REVISION NO.: Initial  
 DATE: 3/16/93 CONTRACTOR CONTROL NO.: \_\_\_\_\_ MODIFICATION NO.: 76  
 (Contracting Officer Use Only)

## 2. DESCRIPTION OF ACTION



## NEW WORK ASSIGNMENT

- Interim SOW, schedule, and LOE
- Complete S. N. Estimate Budget and Schedule

REQUIRED APPROVAL

EPA REGION HEADQUARTERS



## INTERIM AMENDMENT

- Change in LOE, Scope by task
- Add additional tasks or funds

☐ INCREMENTAL FUNDING

EPA REGION HEADQUARTERS



## PARTIAL WORK PLAN APPROVAL



## FINAL WORK PLAN APPROVAL

- Approval of work plan
- Add funds



## AMENDMENT TO FINAL WORK PLAN APPROVAL

- Change in LOE, scope or budget by task
- Add additional tasks or funds (includes OF 68 or SF 1411)

EPA REGION HEADQUARTERS



## TECHNICAL DIRECTION MEMORANDUM

- Detailed scope, budget and schedule
- Review expenditure level
- Minor shift within SOW

(All changes must be within overall scope, budget, and LOE approved by EPA CO)

EPA REGION



## WORK ASSIGNMENT COMPLETION NOTIFICATION (NO ATTACHMENTS)

- Contractor originates
- Regional determination
- When signed by CO, this constitutes a stop work order

CONTRACTOR

## 3. BUDGET INFORMATION

TOTAL FUNDING RECEIVED (\$)

CURRENT --

THIS ACTION 75,000

TOTAL 75,000

\* Other dollar entries may be tracked regularly in expenditure and block EPA estimated LOE hours of effort (HA)

## INTERIM BUDGET

(TECHNICAL LOE)

(\$)

974 75,000

974 75,000

\* Includes fees

## APPROVED

## WORK PLAN BUDGET

(TECHNICAL LOE)

(\$)

-- --

-- --

\* Includes fees

## EXPENDITURE LIMIT (EL)

(TECHNICAL LOE)

(\$)

200 10,000

200 10,000

\* Established by RPM/RPO

## 4. WA COMPLETION DATE

CURRENT 10/15/94

REVISED

## 5. EPA COMMENTS

Initiates a new work assignment. Scoping meeting by teleconference, should be planned to review and discuss SOW within 3 days after contractor receives the work assignment.

## 6. APPROVALS

## CONTRACTOR SIGNATURES

SITE MANAGER/FIRM

DATE

PHONE

REGIONAL MANAGER/FIRM

DATE

## EPA SIGNATURES:

Diana L. Newman 4-8-93  
 REMEDIAL PROJECT MANAGER DATE

Paula Harwood 4-8-93  
 PROJECT OFFICER DATE

PHONE 551-7887



APPROVED AS SUBMITTED



APPROVED WITH CHANGES



NOT APPROVED

Ronald L. Stewart  
 SIGNATURE OF CONTRACTING OFFICER

4/8/93  
 DATE APPROVED

CC EPA Project Officer  
 PC/RPM  
 Contractor  
 EPA Contracting Officer (when only expenditure time column is used)

UPDATE 10/13/86

ATTACH STATEMENT OF WORK  
 (PER DESCRIPTION OF ACTION)

